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CONTENTS

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Original Articles

A POSSIBILITY FOR PHYSIOLOGIC ORTHODONTIC MOVEMENT

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PRACTICAL PART

THE author will show at this time a few of his cases treated previously with recorded ultimate success. Among them are Class III cases in adults, two treated by the author and one by his friend, the late J. Grünberg, of Berlin, following the author's method. There will be shown, further, phases in the course of treatment of cases chosen from many similar ones treated by colleagues here, according to the principles enunciated in this paper.

It will be seen that the Class III cases, especially, which are often refused treatment by orthodontists, prove to be among our easiest ones, requiring little effort by the orthodontist and certainly giving no discomfort to the patient. But in these cases one should be careful not to promise any success until one is sure, as pointed out for orthodontic treatment in general, that the teeth and alveolar process of the maxilla yield as a unit. If the slightest progress can be noticed within three or four months, one may be sure that he will be successful. The ease and simplicity of such "night" treatment is astonishing. In the author's experience there was no relapse in the following types of cases:

a. Class II with the chin in normal relation to the skull (superior protraction) where only the maxillary teeth have to be moved distally without any forward pressure on the mandible by intermaxillary elastics. The curve of Spee must be straightened by natural elongation of the buccal teeth with a bite plate and not by artificial depression of the front teeth.

b. Adult Class III cases, 10 to 40 years of age, where the maxillary teeth and alveolar process as a whole have to be brought forward.

c. Class I cases with a high canine† or canines where the buccal teeth were

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†Such a unilateral case treated with the head cap was shown in the *Angle Orthodontist* 6: 161, 1936.

moved distally by a head cap alone to make room for the canines. Once the canines have occupied the place provided for them, they of course mechanically block any mesial drift of the buccal teeth so no relapse is possible.

It is the author's conviction that the absence of greater destruction of the supporting tissues is responsible for the permanency of the results obtained.

Several orthodontists in this country have tried the head cap as advocated and introduced for this kind of treatment by the author[29*] but dismissed it after a short time; they could not get any result. They were too impatient. The author himself admitted that in several cases the head cap did not work at all or worked only on one side.[29] The reason is not known. The head cap has been used mostly to reinforce anchorage, but that has nothing to do with the principle brought out by the author. He applies the force only on the molars. The subsequent comovement of the buccal teeth comes through the pull of the intact transseptal fibers.

The author is well aware of the fact that the illustrations of the cases do not follow the routine established for publishing clinical material. The models and faces are mostly shown only from one side, the front view is shown only in one case, and x-rays only when available. The models were photographed with the "artificial part" (Angle) cut away in order to use the space thus gained for a reproduction in larger size of the parts in which we are interested, the alveolar process and the teeth. All this was done, as mentioned, because of the emergency to save costs and material.

In the cases to be shown the force of the elastics is mostly responsible for the changes brought about. Though we do not believe it practical to measure out an exact amount of force for any patient, we thought it would be interesting to find out the individual and the average forces exerted by different kinds of elastics stretched a given distance under various conditions. Table I gives the findings.

This distance from the mesiobuccal corner of the lower first molar to the mesial third of the upper canine in nonmutilated Class II cases in the permanent denture amounts to an average of 26.6 mm. The same table demonstrates also the great difference in the force exerted by individual elastics of the same denomination chosen at random, if stretched to the same distance of 26.6 mm.

In general, one cannot compare the figures obtained after "dry" stretching for twenty-four hours to this distance with those obtained after use in the mouth ("wet" experiment) stretched to the same distance for the same time. The reason is that they are too unequal and always yield quite different figures; furthermore, the elastics used in the "dry" experiment of course cannot be used again in the "wet" one. Even using very similar rubber dam elastics† of the most equal cut we find, in the average figures of the "dry" experiment, a difference of 4.9 Gm. (59.7 as against 64.6), and in the "wet" experiment a difference of 3.9 Gm. (56.5 as against 60.4) (Table I). Therefore, to get an

*The references to this paper appear at the end of the "Theoretical Part" in the preceding issue of the JOURNAL.

†The rubber dam used in this experiment is on the market under the name of buff rubber-dam (pure latex) by Hygienic Dental Rubber Company, Akron Ohio. As there are different thicknesses available, the figures may vary quite considerably with the different rubber dams.

TABLE I

FORCE IN GRAMS,* EXERTED BY DIFFERENT ELASTICS CHOSEN AT RANDOM BEFORE AND AFTER HAVING BEEN STRETCHED FOR TWENTY-FOUR HOURS TO THE AVERAGE DISTANCE (26.6 MM.)† FROM THE UPPER CANINE TO THE LOWER FIRST MOLAR IN NONMUTILATED CASES OF CLASS II IN THE PERMANENT DENTURE UNDER DRY CONDITIONS AND AFTER USE IN THE MOUTH

	DENOMINATION	FORCE OF FIVE INDIVIDUAL ELASTICS UNDER DRY CONDITIONS					AVERAGE FORCE OF FIVE ELASTICS	AVERAGE FORCE OF FIVE ELASTICS BEFORE AND AFTER USE IN MOUTH
1	Rubber dam	Before	63.0	57.7	56.6	56.5	63.9	59.7	64.6
		After	60.5	57.7	51.9	53.8	59.0	56.5	60.4
		Loss in %	3.9	0	8.3	4.7	7.6	5.3	6.5
2	Hodgman (Ortho-Spec Products, Chicago) No. 0	Before	251.9	164.3	302.0	305.8	220.0	241.6	304.0
		After	209.9	146.9	220.0	242.0	206.0	204.7	218.0
		Loss in %	16.6	10.5	27.0	20.8	6.3	15.2	28.0
3	Janus-Faber No. 2, thin-cut‡	Before	121.7	118.9	119.7	101.0	96.0	111.2	----
		After	121.6	113.0	118.8	99.0	93.0	108.8	----
		Loss in %	0	4.9	1.5	1.9	3.1	3.0	----
4	Faber 2D	Before	249.0	195.0	198.0	195.0	192.0	205.8	211.0
		After	220.0	158.5	178.0	164.0	158.5	193.8	199.0
		Loss in %	11.6	18.7	10.0	15.8	6.2	5.8	5.7
5	Faber 3D	Before	186.7	198.0	198.0	186.7	192.0	192.6	202.0
		After	158.5	169.8	164.0	181.0	158.5	171.7	184.0
		Loss in %	15.0	14.0	17.0	3.0	17.0	10.8	8.9
6	Faber 5 (Cahen-Davis, Los Angeles)	Before	227.0	220.7	271.0	313.0	283.0	272.9	319.0
		After	263.0	217.9	266.0	291.0	263.0	260.0	295.0
		Loss in %	5.0	1.2	1.8	7.0	7.0	4.7	7.3

*One ounce = 28.3 grams.
†Average of fifteen cases.
‡Not available now.

TABLE II

AVERAGE FORCE IN GRAMS EXERTED BY DIFFERENT ELASTICS WITH THE REDUCED DISTANCE OF 20.6 MM. TOWARD THE END OF TREATMENT OF CLASS II CASES; WITH THE INCREASED DISTANCE OF 37.6 MM. IF THE ELASTICS ARE HOOKED ON THE LOWER SECOND MOLARS, AND IN THE USE OF TWO ELASTICS WITH THE DISTANCE OF 26.6 MM. FROM CANINE TO LOWER FIRST MOLAR

	DENOMINATION	FORCE EXERTED AT A DISTANCE OF 20.6 MM. TOWARD THE END OF TREATMENT	FORCE EXERTED AT A DISTANCE OF 37.6 MM. IN THE USE OF THE LOWER SECOND MOLAR	FORCE EXERTED AT A DISTANCE OF 26.6 MM. (CANINE, LOWER FIRST MOLAR) IN THE USE OF TWO ELASTICS
1	Rubber dam	53.77	82.0	118.5
2	Hodgman (Ortho-Spec Products, Chicago) No. 0	175.5	591.0	----
3	Janus-Faber, No. 2, thin-cut	87.7	141.5	203.7
4	Faber 2D	181.0	333.9	452.0
5	Faber 3D	155.0	249.0	367.9
6	Faber 5 (Cahen-Daivs, Los Angeles)	226.4	396.0	506.0

exact idea in comparing different elastics, use can be made only of the percentage figures, not of the actual ones.

In stating only the average actual figures of the force, we see that rubber dam elastics exert the smallest force (59.7-64.6 Gm.), and Faber 5 the greatest (272.9-319 Gm.). After use in the mouth for twenty-four hours, the results obtained are quite different from the "dry" experiment, because other elastics

had to be chosen. And even with the individual rubber dam elastics in the "dry" experiment, the difference in loss of force is quite considerable (one loses 3.9 per cent, the other 8.3 per cent); and we get extremes with Faber 3D (one loses 3 per cent, the other 17 per cent) (Table I). Under the same dry condition, the greatest *average* loss of force is suffered by Hodgman No. 0 (15.2 per cent), the smallest by Faber 5 (4.7 per cent); then follow the rubber dam elastics with a loss of force of 5.3 per cent. The Faber 5 exerts the greatest force (272.9-319 Gm.) but suffers the least loss of force (4.7 per cent) (except the Janus Faber thin-cut); but the original force is far too strong.

For the "wet" experiments the elastics were not chosen at random but were carefully selected as to size and thickness in order to exert the most equal force on both sides. And still the differences in the two individual elastics after the "wet" experiment were quite considerable, sometimes amounting to 30 Gm.

In the "wet" experiments, the Hodgman No. 0, in the average figures, experience the greatest loss (28 per cent), Faber 2D the smallest (5.7 per cent), while the rubber dam elastics lose 6.5 per cent. As can be judged from these figures (Table I), rubber dam elastics combine three outstanding qualities: they exert (1) the most equal force, (2) the lightest force; and (3) they lose only 6.5 per cent during use in twenty-four hours. The Faber 2D and 3D, which lose 5.7 per cent and 8.9 per cent, respectively, maintain, therefore, their elasticity quite well, but the force exerted is more than three times greater (211 and 202 Gm. respectively) than that of the rubber dam elastic (59.7-64.6 Gm.) (Table I).

If, during the treatment, the distance between the two points of attachment becomes gradually diminished and measures toward the end only 20.6 mm., the force becomes correspondingly diminished (Table II; compare with Table I).

If the lower second molar is chosen for the attachment, thus increasing the distance to 37.6 mm., the force exerted is highly increased; so the rubber dam elastic hooked on the first molar exerts a force of 59.7 to 64.6 Gm., while hooked on the second molar a force of 82 Gm. is exerted. Faber 2D exerts a force of 205.8 to 211 Gm. from the first molar, while from the second molar a force of 333.9 Gm. is exerted (see Table II).

If two elastics are hooked on, which often is done, the force is often more than doubled. With one Faber 2D, e.g., from the first molar, a force of 205.8 to 211 Gm. is exerted, while with two rubbers stretched to the same distance, the force rises to 452 Gm. The force of two Faber 5 elastics amounts to 506 Gm. (17.8 ounces) (Table II), a terrific force. All the figures in the table correspond to the state of rest with the teeth in occlusion; they surely are somewhat different during function. Just a little twisting or curling of the elastics during the experiments, yielded quite different figures. Also, other factors are responsible for differences in the force exerted. As the treatment progresses, the distance of the two points of the elastic attachment in Class II cases becomes gradually diminished and is reduced at the end of treatment by the width of a premolar. That reduces the distance from 26.6 to 20.6 mm. and, correspondingly, the force (see Table II). Also, the well-known fact has to be kept in mind that the elastics disintegrate much more quickly under wet conditions in the mouth, losing a great deal of elasticity and force. So the rubber dam

elastics tested under dry conditions exert, on an average, a force of 59.7 Gm. losing, after twenty-four hours, 3.2 Gm., or 5.3 per cent; in the mouth, if stretched to the same distance for the same time, they lose, on an average, 4.2 Gm. or 6.5 per cent. A similar difference is found also with the other elastics (Table I).

As the kind or denomination of the elastics on the market is not the same in the different parts of the country, a photograph in natural size of those now in general use is shown in Fig. 38 in order to give an approximate idea of the elastics enumerated. Only the size, not the thickness, could be reproduced; the numbered sequel in the tables corresponds to the numbers in the reproduction of these elastics.

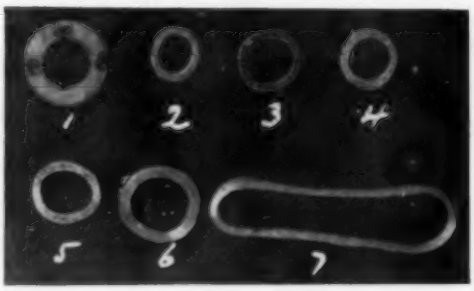


Fig. 38.—Different kind of elastics used, in natural size. *1*, Rubber dam; *2*, Hodgman (Ortho-Spec Products, Chicago), No. 0; *3*, Janus-Faber No. 2, thin-cut; *4*, Faber 2D; *5*, Faber 3D; *6*, Faber 5, sold by Cahen-Davis, Los Angeles; *7*, commercial rubber band No. 10.

Commercial rubber bands No. 10, used extraorally in connection with the head cap and stretched to the average distance of 55 mm., create at the beginning a force on an average of 191 Gm., which after five days is reduced to 158 Gm.; that means a loss of 17.2 per cent. In addition, another point has to be remembered; the head cap, made of a hair net, stretches quite considerably; in five days the distance between the two points of attachment becomes diminished approximately by 3 to 4 mm., partly caused also, in girls, by compression of the hair; accordingly, the force of the rubber bands becomes reduced. To maintain approximately the same amount of force, it is therefore advisable to change the intermaxillary elastics every day, and the extraoral rubber bands approximately every fifth day. These facts have to be kept in mind unless one wishes to use gradually diminishing forces.

We have seen the pathologic changes brought about by forces of 240 and 360 Gm. after a relatively short time, and can imagine the changes after the application, for months and months, of forces amounting to the numbers shown in the tables. Bendias[2] states that the force exerted should never exceed 150 Gm., but no evidence is given on which this claim is based; he states that the intermaxillary elastics in general use were found to exert a force of about 225 Gm. According to Table I, not many elastics correspond to Bendias' claim; several come near the force used in this investigation (240 and 360 Gm.); and they proved injurious.

The numbers shown in Table I indicate that the elastics stamped out of rubber dam are the most preferable ones; but it should be kept in mind that the mechanical obstacles of the occlusion should be eliminated as much as possible

(bite plate). After all, we have evidence already from many in this country, who use these rubber dam elastics exclusively, that results are obtained, often in a relatively short time.

In the following, only phases of treatment will be shown, not final results, merely to illustrate some principles and their application. In all cases, *the force of the elastics was applied only during the night,* with all or most of the appliances removed during the daytime. The head cap was used in Class II and some modification in Class III cases.

The head cap was rediscovered by the author, who rescued it from the oblivion into which it had fallen for decades. The author's only merit in its renewed and now widespread use is that he showed its usefulness for mass movement of teeth by applying the force only to one tooth (molar). This happens by the transmission of force through the transseptal fibers from tooth to tooth as long as the force applied is not so strong as to overstretch or sever these fibers. In this instance, the force acts only on the one tooth to which it is applied, and the gap between it and the neighbor tooth becomes gradually greater and greater. The use of a head cap as suggested by the author was not an intuition but the result of a lucky chance. An actress with greatly protruding teeth, a Class II case with the chin in normal position (upper protraction) came to his office. The upper teeth needed to be brought back. The whole complement of teeth was present. The use of the head cap was suggested so as not to interfere with her professional duties. The suggestion was accepted. The patient came to the office several times at short intervals complaining about soreness of the teeth, impossibility of chewing, and sleeplessness from pain. Each time the force was diminished, and then she did not appear again. Believing that she was loath to continue the treatment, the author was astonished when she reappeared several months later; and what had happened? The teeth had ceased to be sore so she had conscientiously worn the head cap during the months of her starring performances all over Europe. On her return, all the buccal teeth, formerly in Class II relationship, were now in end-to-end bite with no spaces between them except between the first premolars and canines. The treatment was continued with new rubbers (the original pair of rubbers having been worn all the months through) till normal interdigitation was obtained. Thus, a new way for the use of the head cap had been found; previously it was recommended and used only for reinforcing anchorage. A new principle for mass movement was added to the orthodontic inventory, and has been used since then, both in the author's private practice and in the Orthodontic Department of the University of Vienna. Many hundreds of cases have been treated with varying results, depending on the reliability and cooperation of the patient. Only in very few cases did this method prove to be unsuccessful and had to be discontinued after several months of use. The reason for this rare inefficiency, sometimes only on one side, could not be found out. But even with intraoral appliances we sometimes encounter cases which do not yield to any force, light or strong. We cannot explain this refractoriness.

In recommending the head cap for mass movements, the author always emphasized that forces strong enough to overstretch or sever the transseptal fibers should never be used. This opens the originally tight contact points.

Should this happen, the force must be decreased. The importance of the preservation of correct and firm contact points has been acknowledged by the profession since Black, and is one of the fundamental principles of operative dentistry. It is a pity to have to say that not enough consideration is given to this point by many orthodontists; maybe they are not able to maintain or to obtain it, especially when they resort to extractions as a seeming refuge in the treatment. The life span of a denture with malocclusion and tight contact points would be far longer if left untreated than if treated and left with open contact points. Besides the unavoidable traumatic damages inflicted by the treatment itself, the loss of the contacts is another principal cause of premature development of parodontosis. Only by maintenance of tight contact points do we preserve perfect hygienic conditions, eliminating one cause for inflammation and pocket formation. The alveolar process then inevitably becomes resorbed and the periodontal membrane wider; consequently, the tooth becomes looser and its impact against the socket wall greater, enhancing the resorptive effect on the bone; thus, a vicious circle is established.

A clinical case was the first treated intentionally to prove the possibility of mass movement by the head cap. It was a Class I case in a 15-year-old patient; all the upper buccal teeth had drifted forward into Class II relationship with the lowers, blocking out the canines and crowding the front teeth. The models before and after treatment are shown in Fig. 39, *A* and *B*.

Crowding and rotation is mostly caused by lack of room; in such cases, as already mentioned, the creation of the necessary room either by widening or lengthening of the dental arch, as the case may be, will result—and this especially in the maxilla—in spontaneous adjustment of the teeth. Such teeth never relapse. They need neither overrotation nor any kind of retention. Such a self-correction, of course, needs time. In the three years of treatment the gradual gaining of room permitted the unassisted rotation and alignment of the front teeth. (Compare *A* and *B* of Fig. 40). The treatment should have been continued for another year in order to gain some additional room for the perfect alignment of the front teeth and a sharper interdigitation of the buccal teeth; but the patient was unable to continue with the treatment. The gaining of the room necessary for the alignment of the front teeth was obtained only by lengthening; any widening was contraindicated, the arch being wide enough.

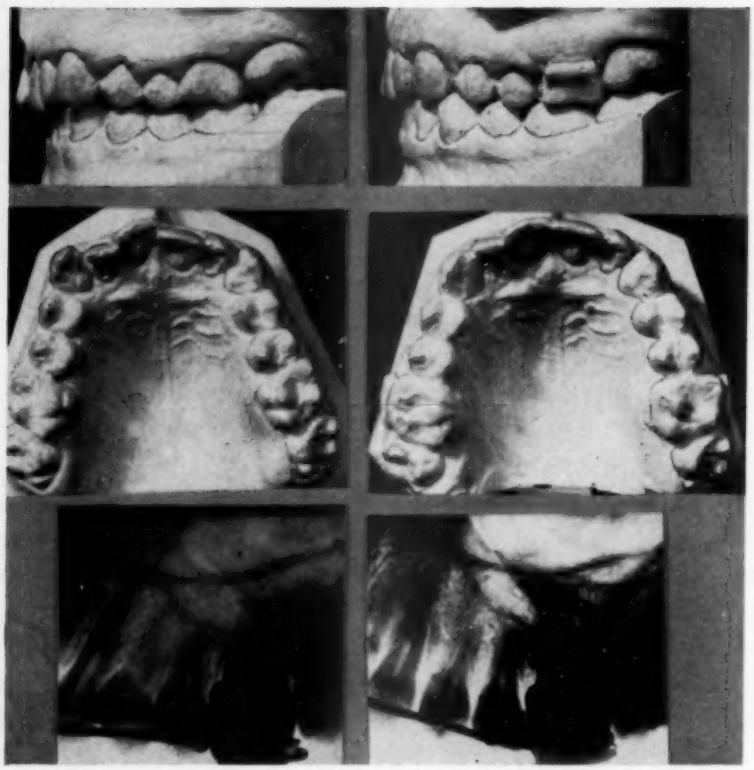
In Fig. 41, *A* and *B*, we see the x-rays before and after treatment. In *B* the interradicular septum between molar and second premolar in the apex region became a little narrower, indicating a slight tipping of the molar. Such a tipping is corrected to normal in daytime by function, but this will not happen once this tipping has progressed beyond a certain limit as in Figs. 43 and 44.

The interdental space is normally bordered by parallel walls formed by the adjoining roots; the interdental bony septum is nearly of the same width at the crest as at the apex; it may sometimes be wider in the apical region by the tapering of the roots. If teeth are tipped mesiodistally, there always takes place a characteristic change in the shape of this space, and, by comparing the x-rays before and after treatment, the kind of movement can immediately be determined. In opening a space, the septum assumes the shape of a cone with

Fig. 39.

Fig. 40.

Fig. 41.



A. *B.*

Fig. 39.—Class II, treated with head cap, before (*A*) and after (*B*) treatment.
Fig. 40.—Occlusal view of Fig. 39 before (*A*) and after (*B*) treatment.
Fig. 41.—X-rays to Fig. 39 before (*A*) and after (*B*) treatment.

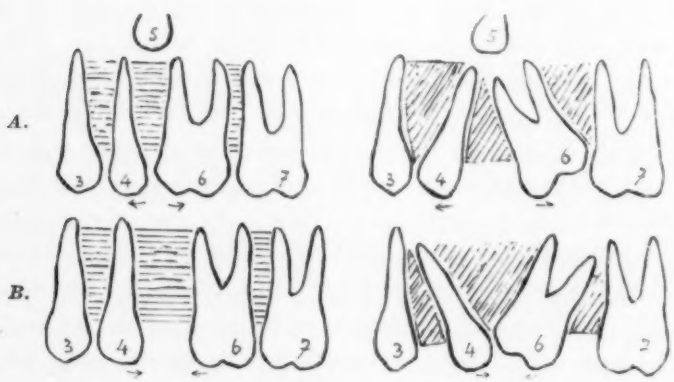


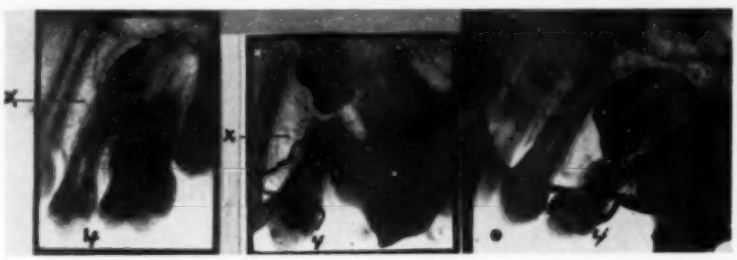
Fig. 42.—Diagram to show the change in shape of the interdental septum in opening (*A*) and in closing (*B*) a space by tipping of the adjoining teeth.

its base toward the alveolar crest (Fig. 42, *A*). In closing a space, the base lies near the apices (Fig. 42, *B*). The exaggeration of the cone shape depends on the degree of tipping.

In Fig. 43, A and B (before and after opening the space for an impacted second premolar), such a strong tipping and its possible consequences are illustrated. By tipping the teeth concerned, space for the second premolar was secured within the arch (Fig. 43, *B*) but the apices of the first premolar and first molar came into contact (Fig. 44, *B*) simulating entirely the situation in the sketch (Fig. 42, *A*). The bony septum assumed the characteristic cone shape;

A. *B.*

Fig. 43.—Opening the space for an impacted second premolar before (*A*) and after (*B*) treatment.



A. *B.* *C.*

Fig. 44.—X-rays to Fig. 43 at the start (*A*) and after gaining (*B*) the space in the row; (*C*), resulting transposition of second premolar; see Fig. 42*A*.

the cone formation is still more pronounced in the interdental space between the first premolar and the canine (*x*, Fig. 44, *A* and *B*) and is of course opposite to the shape of the cone between the molar and the first premolar. From the original position of the second premolar (Fig. 44, *A*), a normal spontaneous eruption was to be expected after procuring the necessary space; but under the prevailing condition this could no longer occur. The large space of cancellous bone in front of the apex of the first premolar gave good opportunity to the second to deviate in its eruption toward this space of the least resistance (Fig. 44, *B*). A transposition was established. After space was gained, a retainer was inserted. We now expected the uprighting of the premolar by function as is often, though incorrectly, claimed to happen.* As this did not occur after one year of useless waiting, a new x-ray (Fig. 44, *C*) was made, which revealed the situation and the reason for the noneruption. The root resorption of the first premolar, already noticeable at the time of the reten-

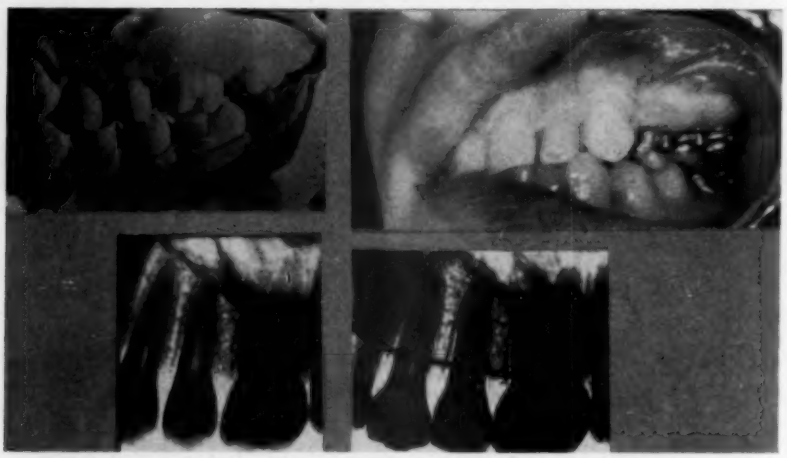
*In cases of slight tipping, this standing up occurs by the beneficial influence of function as in Fig. 39.

tion, had made further progress during this period (Fig. 44, *B* and *C*). The first premolar had to be extracted to give the second opportunity to erupt. The lesson learned from this case is too obvious to need further comment.

Fig. 45, A and B, shows the case of a 13-year-old patient, before and after treatment, performed by Dr. C. Stenson Dillon, Los Angeles; on both sides the space for the upper canines was reduced considerably by the mesial drift of the buccal teeth crowding out the canines. Between the two models lies a time interval of eleven months. On both sides in the upper jaw, the $\frac{654}{456}$ were united by buccal segments 0.012 inch round and 0.010 by 0.028 inch flat wires;

Fig. 45.

Fig. 46.



A. *B.*

Fig. 45.—(Dillon) Procuring space for the high cuspid that was crowded out by the mesial drift of the buccal teeth into Class II relation; elastics worn only at night.

Fig. 46.—X-rays to Fig. 45; no tipping of the buccal teeth.

in the lower jaw a passive lingual arch was placed with hooks on the molar bands for the elastics. The other point of attachment was a hook in the upper first premolar region. The initial distance of the hooks was 19 mm. and became reduced to 15 mm. as the segments responded; the position of the intermaxillary ligature hooks was not changed as treatment progressed. The elastics were used only at night, and for months the same elastics were used for two consecutive nights. Though the mastication stresses were terrific (sharp cusps and deep facets of wear), with the patient's good cooperation, the movement was performed in a reasonable time. In comparing *A* and *B* in Fig. 46, the x-rays before and after treatment, no change in the bony septum between the first molar and second premolar is noticeable, indicating any tipping. But it may be assumed that the rigid union of the buccal teeth precluded tipping. Anyway, the remarkable change was obtained by applying the force only at night.

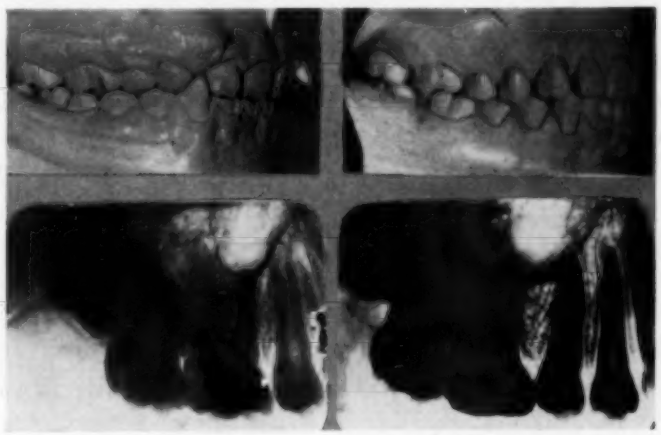
Fig. 47, A and B, (Case 1, Gould) shows the models, before and after treatment, of a 12-year-old girl with Class II malocclusion. The upper teeth were too far forward (superior protraction), and had to be brought back. But as the chin position was normal, forward pressure on the mandible had to be avoided; intermaxillary elastics were contraindicated. The choice of appliances

was thus limited to one with extraoral anchorage, the head cap. It was used as recommended by the author for the comovement of teeth through the pull of the transseptal fibers.* However, the No. 10 rubbers proved strong enough to open contact points. To counteract this effect, tiny springs were embedded in the upper bite plate to push against the mesial surfaces of the first premolars, thus keeping the contacts closed. On the plate, the mesial part of each embrasure between the buccal teeth was cut away, removing these potential obstacles to the distal movement.

The bite plate straightened out the curve of Spee by permitting the elongation of the buccal teeth (Fig. 47, *A* and *B*)† and made the distal movement of the upper teeth easier by relieving the interference of the occlusion.

Fig. 47.

Fig. 48.



A. *B.*

Fig. 47.—(Gould, Case 1) Crowding out of the cuspid by mesial drift of the buccal teeth into Class II relation; head cap worn only at night. No appliances in the mandible. *A*, before, and *B*, after treatment.

Fig. 48.—X-rays to Fig. 47; no tipping of the molar; distinct tipping of the second and first premolars (for explanation, see text).

The rubber bands were commercial No. 10 (*7* in Fig. 38), stretched about 55 mm. between the points of attachment. The force averages 190 Gm., decreasing after five days of stretching in the dry experiment to about 158 Gm., a loss of 17.2 per cent. In practice, this loss is made even greater by the body warmth and humidity (perspiration). With one rubber band on each side, the force applied amounts to 380 Gm. As stated above, this is too great. The treatment is now nearly finished and the rubbers will be worn only every other night.

The x-rays before and after treatment (Fig. 48, *A* and *B*) prove that the molar was moved distally without tipping. The interdental space between the first and second molar has maintained its parallel walls, as can be seen from a comparison of the two pictures. But the bone septum between the first molar and second premolar, instead of preserving these parallel walls (Fig. 48, *A*), shows a widening in the apical region. If the molar had tipped distally, this interdental space would have become narrower toward the apex. The widening in the apical region resulted from the distal tipping of the crown of the second

*A detailed description of the head cap method as used by the author is given in the *Angle Orthodontist.*[29]

†Also described in the *Angle Orthodontist.*[29]

premolar by the continuous pressure of the tiny springs. This is a good example of how a force acting continuously produces a result different from one acting at night only. There can be no question as to which is the preferable way.

The treatment took four years. The duration of treatment might have been less if the head cap had not been left off on various occasions, as during summer camps, an attack of mumps (four weeks), and at times because of carelessness. Slight relapses occurred at these times, because the occlusion had not yet been fully corrected and the tissue rebuilding was still under way.

Even when a proper interdigitation has been obtained and treatment seems to be finished, the head cap should still be worn until the bone has become consolidated. There is no retention period in the usual sense. The active treatment period passes over into retention by gradually reducing the amount of time the head cap is worn. After the occlusion is satisfactory, it should be worn every other night for four or five months, followed by a similar period of twice a week, then a period of only once a week, to be finally discarded. The period of diminishing use of the head cap, therefore, lasts twelve to fifteen months.

The average duration of "treatment" is three years, plus the "retention" time of one year. Of course, the patient remains under observation though no retainers are worn. During these four years, the patient need not be seen oftener than once every two months—twenty-four appointments in four years. Conscientious orthodontists starting cases between 6 and 10 years of age, watch them from 8 to 12 years, until all the permanent teeth are in occlusion.

Fig. 49, A (Case 2, Gould), Class II, Division 1, subdivision right side. The left side exhibits good relationship both before and during treatment. This case was treated with upper and lower plates. No bands at all were used. Wires were run across the front teeth to retract the central incisors, both upper and lower, and to help keep both plates in place. In the maxilla the wire may not have been absolutely necessary for stabilization, as the intermaxillary elastics, worn at night only, would probably not have broken the suction of the plate.* With the mouth practically closed, the delicate rubber dam elastics stretched almost horizontally, exert relatively little pull and present very little vertical component. The occasional closure of the front teeth as in swallowing, and the tongue pressure also help to keep the plate in place.

A new elastic was put on the right side every night; the following night, when its pull had been reduced by deterioration of the rubber, it was transferred to the left side. Here it was used for some time to counteract any tendency of the right side intermaxillaries to throw the left side distally into Class II relation. At the end of that time (six weeks), the lower left side was moving mesially toward what might be called a "Class III" relation. On discontinuance of the left side elastics, that side returned to its original good relationship and has remained so. The lesson we learn is that even rubber dam elastics weakened by ten hours of wearing were strong enough to shift the normal side forward. (Dr. Atkinson, as we will see later, had a similar experience.)

The patient was instructed then to wear a rubber on the right side only, putting on a new one after the old one had been worn three consecutive nights.

*Clasps are never used so as not to interfere with the elongation of the buccal teeth.

The appliances were out of the mouth for one week during the treatment because of a gum soreness of unknown etiology.* After nine and a half months, the patient was told to put on the intermaxillaries only every other night, but to wear the same rubber three times before discarding it. During the daytime, though the elastics were left off, the plates were worn to widen the upper and lower premolar-cuspid region by pushing with gutta-percha wedges stuck to the plates. The width between the upper first premolar was increased from 32 to 35 mm. in about ten months. The upper plate acted also as a bite plate to allow vertical growth in the molar-premolar region.[29] After ten months, the mesiodistal relationship has greatly improved (Fig. 49, *B*); three or four months more of active treatment will probably make it normal.

The active treatment, as already mentioned, should pass almost imperceptibly into the retention period by gradual reduction in the number of nights per week the elastics are worn, until they are discarded entirely.

This case, one of many, is shown to prove that light stimuli—the weakest elastics at our disposal—applied only at night or even less frequently, are strong enough to bring about changes in mesiodistal relations without any soreness or discomfort whatsoever.

A. *B.*

Fig. 49.—(Gould, Case 2) Class II, Division 1, subdivision on the right; upper and lower plate; elastics worn only at night (ten months); before (*A*) and after (*B*) treatment; *B* is a study model (for details, see text).

As this and Dr. Atkinson's case (Fig. 58) are the first two cases of Class II in which the treatments were conducted in the way outlined, we may be permitted to go into some details.

The impressions for the models shown in Fig. 49, *A* were taken in February, 1943. The impressions for the models in Fig. 49, *B*, were taken on Jan. 28, 1944. To obtain the present stage, 297 days, or to be more exact, 290 days were needed, for the plates were out of the mouth for seven days because of gum soreness. Ten hours each night makes a maximum of 2,900 hours of force application, assuming that the patient did not forget to wear the rubbers any night. This would be the equivalent of 120 three-fourth days, if the rubbers were worn continuously. If the elastics had been worn continuously during these 290 days, as in routine practice, the time of active force application would have amounted to 6,960 hours; 4,060 hours of force application were thus saved. The difference in tissue reaction that this must entail can easily be imagined!

Many Class II cases were treated with plates by the author, especially for economic reasons, in the orthodontic clinic of the University of Vienna. The results were quite satisfactory. The rubber dam elastics, which the author has

*To avoid any irritation of tissues it was the author's routine practice to polish a very thin tin foil on the plaster model before vulcanizing, and to fasten it in several places with glue. After vulcanizing, the plate comes out of the vulcanizer with a highly polished surface that should not be touched by any instrument, brush or felt cone with pumice and chalk. If the plate fits and does not rock, no irritation of the tissue ensues even after months of use.

used exclusively for fifteen years, were worn twenty-four hours a day. At the beginning of last year, the histologic evidence from the specimens used in this article showed that primary osteoclasts remain active for several days. The osteoclasts once being brought into being in our way of treatment by applying only stimuli, continue their work uninterruptedly, invisible of course, for several twenty-four-hour periods (three to four days). They produce the visible effect as if the force were active exclusively in the desired direction only, but with these great differences: (1) the result is obtained much more quickly; (2) the force is not applied to individual teeth, so no bands are necessary; (3) the force, being distributed on all teeth of a jaw, produces incomparably less damage to all the tissues concerned; (4) the contact points remain tight; (5) the work of the operator is cut down to a minimum; (6) no special retention appliances are necessary, the active treatment passing over into retention by gradually increasing the intervals between the times of renewed force application; (7) the mouth hygiene remains perfect; (8) once the patient has become accustomed to the appliance, the treatment itself is conducted without any discomfort. These are sound enough reasons for an orthodontist to at least try such a way of treatment.

Based on the new findings on the life span and continued activity of the primary osteoclasts, the author suggested to Dr. Gould and Dr. Atkinson that they try the application of light elastics only at night in connection with a lower lingual arch or plates which Dr. Gould had been using for some time. The result so far obtained in the cases is shown in Fig. 49, *B* and was accomplished in a very reasonable time. It must be conceded that a way of treatment that is probably physiologic, as outlined in theory in the first part of this paper, has also proved satisfactory in practice. This occurred even more spectacularly in Dr. Atkinson's case, as will be shown later.

Of course, it is the task and duty of Dr. Gould to report in this same JOURNAL with all needed records and data, as soon as the treatments are finished and the patients dismissed. He will have to report about the permanency of the results, and, if they failed, why. He will have to start many similar treatments and report his experiences.

The time since the plan for such a procedure was conceived has been too short (one year) to be able to show many cases, especially in this report in which it is the intention to give some samples only. And, above all, a trial had first to be made.

It has been stated several times that molars, especially lowers, cannot be tipped distally, let alone moved back bodily. Two cases of bodily distal movement, one treated by Dr. Gould and one by Dr. Barkelew, will be shown here. Others will be reported by the orthodontists themselves. Only one phase of treatment will be demonstrated.

In Fig. 50 (Case 3, Gould), we see the case as started by Dr. Gould. According to the general plan, it was decided to move first the lower molars distally (more on the right than on the left side) to provide room for the right second premolar, canine, and lateral incisor. The right lateral view is shown in Fig. 50, *A* and *B,* before and after finishing this phase of treatment. Between *A* and *B* lies an interval of eighteen months. In Fig. 51, *A* and *B,* we see the corre-

sponding occlusal views. The distal movement of all the buccal teeth was accomplished with the head cap alone, without any other distal pressure on the premolars. As soon as the distal movement had progressed far enough to provide room for the canine, it was gradually pushed back by tightening a wire running from a lower plate across the front teeth. The canine was not only raised to its normal angle of inclination but was at the same time moved lingually (Fig. 51, *A* and *B*). The same plate was used to move the second right premolar buccally by means of interposing gutta-percha between tooth and plate in intervals of fourteen to twenty-one days. The curve of Spee was straightened out by a bite plate. The crowns of the premolars and canine are much more erupted in *B* than in *A* in Fig. 50. The x-rays before and after treatment are shown in Fig. 52, *A* and *B*. In comparing them, one has proof that the molar was not tipped back. The interdental septum between molar and premolar has maintained its original shape, being only somewhat wider.

Fig. 50.

Fig. 51.

Fig. 52.

A. *B.*

Fig. 50.—(Gould, Case 3) Distal movement of lower molars and premolars; head cap worn only at night; straightening out curve of Spee by bite plate; *A*, before, *B*, after accomplishing this phase of treatment.

Fig. 51.—Occlusal view of Fig. 50 before (*A*) and after (*B*) distal movement of the buccal teeth.

Fig. 52.—X-rays to Fig. 50; no tipping of the molar (for details see text).

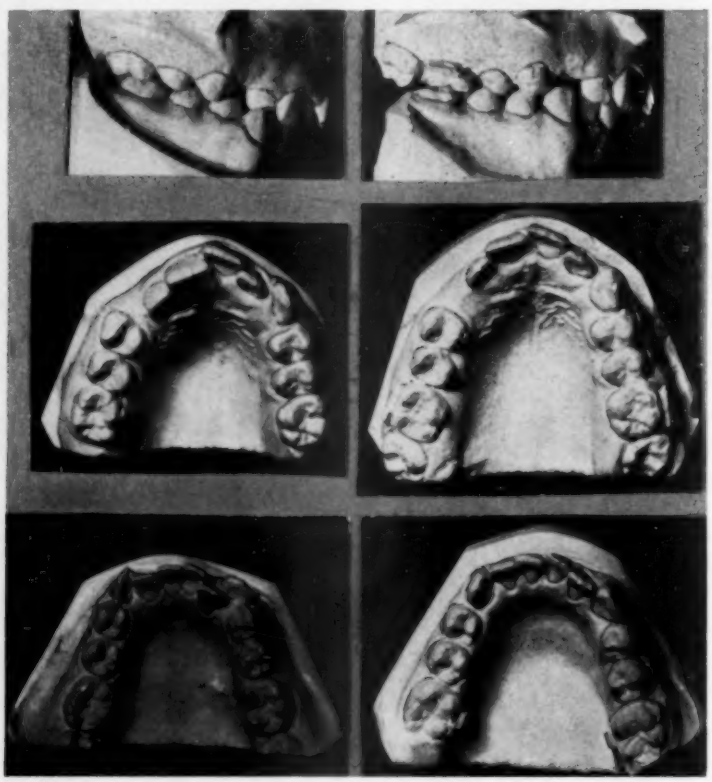
Critique.—The author does not agree with several details in Cases 1 and 3 treated by Dr. Gould. A great deal of unnecessary work was done which Nature would have taken care of by herself. This, of course, would have needed more time.

In Fig. 53, A, we see the models of a 12-year-old patient at the start of the treatment, conducted by Dr. Berneice L. Barkelew, Riverside, California. It is a neutroclusion case. Here, also, only a phase during the treatment will be demonstrated. The face exhibits a normal profile. The space for the upper and lower canines and lateral incisors (the latter both blocked in lingually) was reduced to quite a considerable degree by the uniform forward drift of the buccal segments maintaining their normal interdigitation (Class I). In order not to end with a double protrusion, the necessary room had to be gained by the distal movement of both buccal segments, using the head cap. This was started in the mandible after the second molars had been extracted. After fifteen months, all the lower teeth were moved so far back as to establish a full Class II relationship (Fig. 53, *B*). Models at this stage were not taken. Those shown in Fig. 53, *B* represent a somewhat improved condition because for six months the head cap has been worn in the maxilla in order to re-establish Class I relationship.

Fig. 53.

Fig. 54.

Fig. 55.



A. *B.*

Fig. 53.—(Barkelew) Mesial drift of all upper and lower buccal teeth in normal relationship, reducing the space for the canines and lateral incisors; at the start (*A*) and after accomplishing one phase of the treatment (*B*), the distal movement of the mandibular buccal teeth into Class II relationship by the head cap.

Fig. 54.—Occlusal view of upper jaw at the start (*A*) and after some distal movement of the upper buccal teeth by the head cap; the space so far gained permitted a corresponding self-alignment of the front teeth.

Fig. 55.—Occlusal view of the mandible of Fig. 53 at the start (*A*) and after distal movement of the buccal teeth (*B*) by the head cap; the space gained thereby permitted the self-alignment of the front teeth.

In the lower jaw commercial rubber bands No. 18 were used. Their length in unstretched condition amounts to 72 mm. If stretched to the distance of the two points of attachment, in this case 91 mm., the two rubber bands exert a force of 106.12 Gm. But even this force—small, if we consider the strong rubber bands commonly used in connection with the head cap—proved to be too strong and the contact point between the two lower premolars opened. But the transseptal fibers between molar and second premolar were strong enough to resist such an opening. To avoid a further increase of the gap, seven months after the start of treatment, *intramaxillary* rubber dam elastics were worn from the first premolar to the molar simultaneously with the head cap at night. The canine again followed the first premolar unassisted, assuming at the same time a more lingual position. Its rotation took place without any mechanical assistance.

Fig. 56.

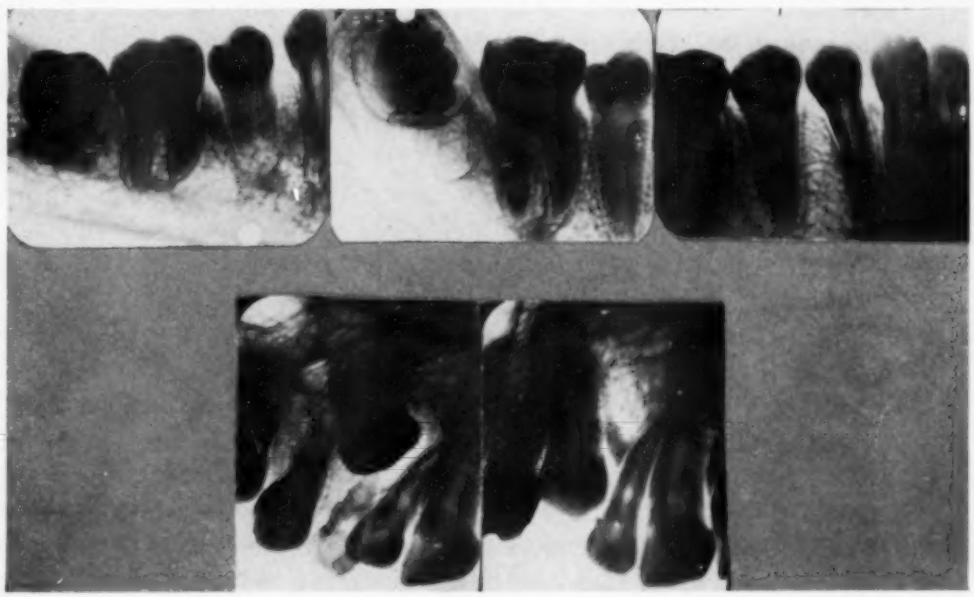


Fig. 57.

Fig. 56.—X-rays to case, Fig. 53; at the start (*A*); first molar was brought back into the place of the extracted second molar without tipping; now in proximity to the third molar (*B*) by closing the broken contact point between the two premolars by means of intramaxillary elastics the first premolar tipped quite considerably (*C*).

Fig. 57.—X-rays of case, Fig. 53; upper right canine at the start (*A*); by the recently started distal movement of the upper buccal teeth with the head cap, and the unlocking and self-movement of the upper lateral incisor into labial alignment, the canine starts its eruption (*B*) on account of the space thus increased.

The difference in the action of the head cap and the intramaxillary elastics shows up in the x-rays. Fig. 56, *A* shows the condition at the start with the second molar still present. Fifteen months later, the first molar occupies in an upright position the place of the second molar, and is approaching the third still in its crypt (Fig. 56, *B*). Had the molar really tipped (to a slight degree it did) its apices would have moved forward causing the interdental septum to assume the characteristic cone shape (sketch, Fig. 42). But this did not occur. In Fig. 56, *C*, we see how the second premolar followed the molar in upright position (compare *A* and *C* of Fig. 56), while the first premolar is tipped

distally; the shape of the interdental septum between the two premolars assumed the characteristic cone shape. This considerable tipping happened though the force was working eight months less than that of the head cap. But also this tipping, as in Gould's Case 1 (Fig. 48), could have been avoided by using lighter forces and avoiding any direct application of force to the premolars. Unassisted, the canine followed the first premolar with no appreciable change in the bony septum between it and the first premolar because no direct force was applied to the canine.

By the distal movement of the canine, enough room was secured for the unassisted alignment of the lingually impacted lower lateral incisor (Fig. 55, *B*) while at the same time the upper lateral incisor became unlocked; also, it came into alignment of its own accord (Fig. 53, *B* and Fig. 54, *B*).

By comparing the occlusal view of the mandible at the start (Fig. 55, *A*) with that at the present stage (Fig. 55, *B*) one can observe how all the front teeth, the canines included, arranged themselves unassisted.

After six months of the head cap for the distal movement of the maxillary buccal segments, here, also, a spontaneous improvement in the position of the front teeth can already be seen, similar to the conditions shown in Fig. 40 (compare *A* and *B* of Fig. 54). The spontaneous adjustment of the upper lateral incisor labially and the distal movement of the buccal segments for six months provided so much room for the originally impacted upper canine that its eruption is now in progress (compare *A* and *B* of Fig. 57).

Critique.—The distal movement of the upper and lower buccal segments can be performed simultaneously, gaining considerable time. Also, in this case the forces used were too strong.

The case shown in Fig. 58, A and B, before and after treatment, is an exceptional one. The treatment was conducted by Dr. Spencer R. Atkinson, Pasadena, Calif. It deals with a 4-year-old girl, Class II, Division 1, subdivision on the left side. As is well known the cases of subdivision usually offer greater difficulties than full Class II cases. In addition, we had to deal with the thumb-sucking habit which aggravated the condition in the maxillary anteriors. In the mandible a lingual arch was inserted on the second deciduous molars; in the maxilla a plain labial arch in tubes on the second deciduous molars was used. Rubber dam elastics were worn at night only, using the ones already used on the left side the following night for the right, where there existed a slighter deviation in Class II relation (Fig. 58, *A*). The treatment was started on Aug. 27, 1943; the models, Fig. 58, *B,* were taken on Jan. 25, 1944. By leaving the upper arch in contact with the front teeth, their protrusion was reduced in the progress of treatment, acting at the same time as a means to prevent their renewed protrusion by the habit that is not yet broken. The time necessary to bring about the result shown (nearly the finished state) is an all-time record. It took exactly five months (151 days); ten hours each night makes 1,510 hours of force application; this would be equivalent to 63 days in the routine practice. If the force had been applied during these 151 days continuously, day and night, the time of active force influence would have amounted to 3,624 hours; 2,114 hours were saved with all the beneficial consequences as

far as tissue reaction alone is concerned. Such results obtained in the incredible time of 63 days (and 120 days in Gould's case, Fig. 49) of active force application were and are impossible in the routine way of continuous force application; no Class II case was ever treated and finished or nearly finished in such record time. Nearly all the other cases treated in a similar way show similar figures, smaller or higher, depending on the patient's age. To put this in other words: the light force of rubber dam elastics (the lightest now available), applied for a certain number of working hours (1,510 in Atkinson's and 2,900 in Gould's case) but distributed over a longer period of time, bring about undreamed-of changes probably with little damage to the tissues. But if the same time of active force application even in the use of much stronger forces is condensed into 63 and 120 three-fourth days and nights (as in our cases), no visible or at least no appreciable improvement is obtained, but, invisibly, great damage has been inflicted to all tissues concerned.

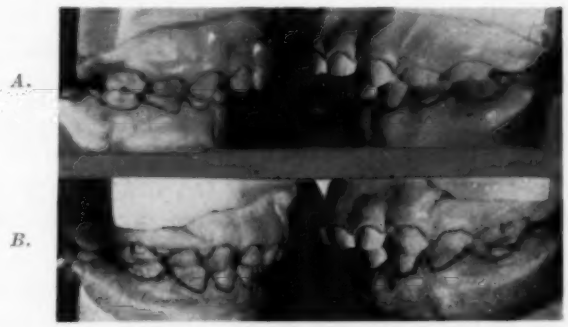


Fig. 58.—(Atkinson) Class II case, subdivision on the left; thumb-sucking habit; rubber dam elastics only at night; before (*A*) and after nearly finished treatment (*B*); record time exactly five months (for details, see text).

We saw the results obtained after 1,510 (Fig. 58) and 2,900 (Fig. 49) hours of intermittent *light* force application (63 and 120 days). If much *stronger* and continuously working forces had been used during the whole time in which this application of intermittent light forces was employed (151 and 290 days with 3,624 and 6,960 hours), in most instances no appreciable results would have been achieved. If we compare these different ways of treatment and the results obtained in both ways, then there is, for this great difference in the results, only one explanation: by the new form of force application only primary osteoclasts are brought into being and kept at the height of their efficiency in the desired direction. In the routine practice everything is done to prevent or at least to reduce such an activity. Only secondary osteoclasts are on the battle-ground; they work in every direction, except the intended and desired one; the bone exposed to the direct pressure, which is supposed to remove this obstacle for the movement, shows no signs of any reaction; on the contrary, it becomes aplastic; the signs of vitality of the bone not on the surface alone disappear. (Osteocytes!) These secondary osteoclasts, too, clear the way for our movements at last, but much more bone, whose vitality became reduced or lost, has to be removed; that means that a much greater span of time is needed to accomplish this. And this loss of precious bone occurs mostly in places—alveolar crest—which, according to reliable authorities, never become replaced.

The record times necessary to bring about the results shown in the two cases of Dr. Gould and Dr. Atkinson (Figs. 49 and 58) probably could be reduced still more had the force application been limited to every second and third night; but this still has to be proved. The quickness in achieving these results, especially in case, Fig. 58, depended surely also on the young age of the patient, when the reaction potentialities of the tissues are most vigorous.

Nothing definite, of course, can be said about the compensating osteophytic bone formation in the proposed way of treatment, but it may be assumed to exist, for the the preliminary conditions are present.

The writer is authorized by Dr. Atkinson to report on his (Dr. Atkinson's) general experiences in the use of intermaxillary rubber dam elastics, worn at night only. Many Class II cases are under actual treatment and the results so far achieved in all cases are satisfactory. The same procedure is used during the retention period in all Class II cases treated in another way as a precautionary measure. It was found in cases where the interdigitation was perfect at the beginning of the retention period, that after several months the rubber dam elastics had to be discontinued because the patients presented themselves as overtreated. Where the results of the active treatment were not so perfect and the elastics were worn regularly, also only at night, the patients presented themselves after several months in as good a condition as could be desired. The author reports these experiences only to give a wider practical proof that a relatively light force applied only at night is a sufficient stimulus for the creation of osteoclastic activity to bring about remarkable changes.

In Class III cases of advanced age a cosmetic result can be obtained only symptomatically, not causally; a diminution or influencing of the mandible in a distal direction by orthodontic means is impossible; but to counterbalance the protrusion of the chin the maxilla as a whole (not the individual teeth) can be easily brought forward. The cosmetic result is sometimes astonishing and in every respect satisfactory. Occasionally this procedure does not yield satisfactory cosmetic results. Whether or not one will be successful cannot be foreseen at the start of the treatment, but to spare a patient surgical intervention, it is worth while to try first this orthodontic way, not at all troublesome, for which there is seemingly no age limit. Nothing is lost by the postponement of the surgical intervention.

In reference to Hemley's article, "The Surgical Correction of Mesioclusion,"* I suggest that operation which was done in two of my cases. (I regret the records are not now available.) Sometimes as already mentioned, after the orthodontic treatment is finished the cosmetic result is still unsatisfactory because the chin still protrudes too much. This lack of harmony can be helped by removing some of the eminentia mentalis. The operation is simple; the incision is made under the chin so that even the slight scar does not show. The sutures can be removed after five days as in any other aseptic surgery, and the patient has had no interference with chewing whatsoever.

The clinical procedure is quite simple. All one needs is the fitting of two upper molar bands with a well-adjusted lingual arch, supported by spurs on canine bands (Fig. 59). The way in which the maxilla is brought

*Hemley, Samuel: The Surgical Correction of Mesioclusion, AM. J. ORTHODONTICS AND ORAL SURG. 30: 241, 1944.

forward by a chin cap with rods pointing upward and adapted in width to the angles of the mouth is shown in Fig. 60. Single rubber dam elastics are stretched between hooks on the molar bands and notches at the upper ends of the rods. Stretched to the average distance between the two points of attachment (41 mm.) they exert a force of 110 Gm. Should the rods be drawn too much toward the lips and impinge on them, a nonelastic cord should be fastened in a hole at the lower distal border of the chin cap and tied around the neck. Thereby, the chin cap is tipped forward and the rods are drawn away from the lips.

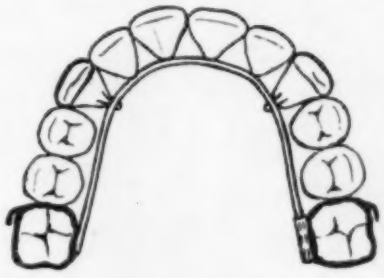


Fig. 59.—Appliances in the maxilla used by the author for the treatment of Class III cases. Lingual arch supported by two spurs on canine bands.

Fig. 60.—Head cap and chin cap as used by the author in the treatment of Class III cases (for details, see text).

By this way of bringing forward the maxilla as a whole, the angle of inclination of the front teeth, usually normal in these cases, does not become impaired and also their spacing is avoided. If the lingual arch is not correctly adapted to contact with the front teeth or if heavier than rubber dam elastics are used, or even these more frequently than only at night, with the intention to speed up the movement, a slipping of one or the other contact points in the buccal region, the canines included, or a crowding and rotation of the front teeth may result. The author had to experience this quite annoying occurrence before becoming proficient enough to avoid it.

Fig. 61, A and B shows the models of a 13-year-old patient before and after treatment; it is a real Class III case; in the molar region the extent would even be greater after the shedding of the second lower deciduous molar. The

upper first molar that now occludes with the distal third of the lower first molar would have lost also this occlusal contact and would occlude then only with the second lower molar. On the left side the occlusal relationship is somewhat

Fig. 61.

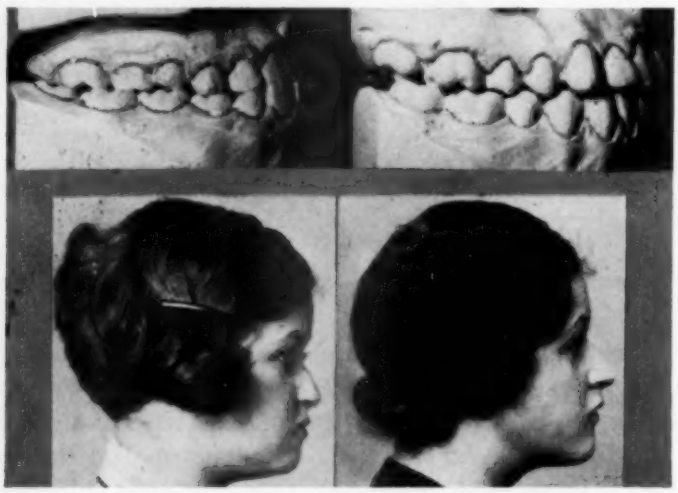
Fig. 62.

A. *B.*

Fig. 61.—Class III case before (*A*) and after (*B*) treatment.
Fig. 62.—Profile view of Fig. 61 before (*A*) and after (*B*) treatment.

Fig. 63.

Fig. 64.



A. *B.*

Fig. 63.—Class III case before (*A*) and after (*B*) treatment.
Fig. 64.—Profile view of Fig. 63 before (*A*) and after (*B*) treatment.

better. When the mesial movement of the maxilla in the way outlined was completed, only insignificant changes had to be performed for the accommodation of the canines and for overcoming the lingual occlusion in the buccal region.

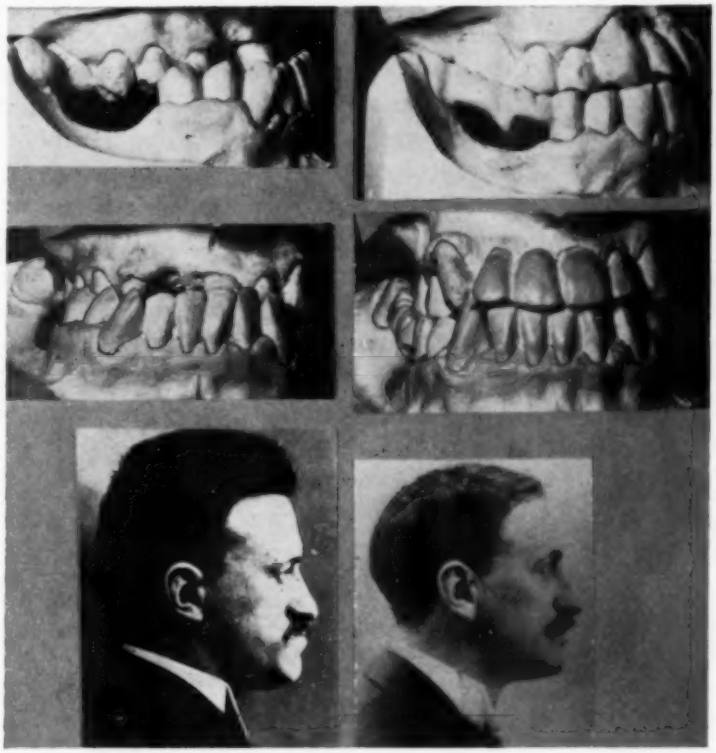
This expansion was also only of some minor degree for by the forward movement the maxilla came in a narrower width of the mandible. The treatment lasted over three years. The cosmetic result can be judged by comparing *A* and *B* of Fig. 62. X-ray records are not available.

Considering again the working hours of the appliances in three years and three months, we obtain the following figures: A total of 11,850 hours were spent, less three months of rest periods (ninety nights of ten hours each) making 10,950 hours; this corresponds to 456.25 days; exactly one year and three months if the treatment had been performed with continuous forces.

Fig. 65.

Fig. 66.

Fig. 67.



A. *B.*

Fig. 65.—(Grünberg) Class III case; 40 years old; before (*A*) and after (*B*) treatment.
Fig. 66.—Front view of Fig. 65 before (*A*) and after (*B*) treatment.
Fig. 67.—Profile view of Fig. 65 before (*A*) and after (*B*) treatment.

In Fig. 63, A and B, are shown the models before and after treatment of a 10-year-old patient; the extent of the anomaly is half a cusp on both sides. It was treated in the same way as outlined above. The intervals of control were quite extended. The patient lived in Warsaw (Poland) and there were always great difficulties to overcome to get permission to leave the country. So it happened that in the four years of "treatment" the patient came only four times for control. One year before the last visit one molar band had broken and the patient remained without an appliance for a year. At this time the models in Fig. 63, *B* and photographs in Fig. 64, *B* were taken. In the meantime, the deciduous teeth had been replaced by the permanent. The cosmetic result is shown in Fig. 64, *B*. X-ray pictures are not available.

Making the same calculation for the actual treatment time in this case we arrive at the following figures: three years' use of the head cap at ten hours makes 10,950 hours minus 900 granted for rest periods; there remain 10,050 hours, that correspond in continuous treatment to 418.75 days or one year, one month, and three weeks.

The models shown in Fig. 65, A and B and the front views in Fig. 66, *A* and *B*, before and after treatment, represent a quite advanced case of a 40-year-old patient, treated by the late J. Grünberg, Berlin, in the same way as outlined, with the exception that twice a week, also during the daytime, intermaxillary rubber dam elastics were worn from hooks on a lower labial arch to hooks on the upper molars. The lower arch was removed and replaced by the patient. According to our present knowledge we would not now reinforce the night elastics by elastics during the day. On several details exact data cannot be given, as the records are not at the author's disposal. The author can only report what he remembers of information received from Grünberg when the author saw the patient on several occasions. The treatment lasted about four years and was continued for another year with gradual elimination of the elastics before the bridgework was made. In the course of the treatment, the bite was gradually raised by a lower partial denture to obviate the resistance of the lower incisors. No attempt was made to correct the lingual occlusion of the buccal teeth. No x-ray pictures are available. The face before and after treatment is shown in Fig. 67, *A* and *B*. About ten years after finished treatment, the condition was perfect. This case is shown only to prove that, for such kind of treatment, there seems to be no age limit.

We should like to express our thanks for the readiness and kindness of Drs. Atkinson, Barkelew, Dillon, and Gould for securing and putting at our disposal some of their clinical material.

An expression of special gratitude and thanks is extended to Dr. B. Orban, Chicago, for the splendid work he performed in making the photomicrographs, Figs. 11, 13, 14, and 28 in the first part of this paper.

FUTURE DEVELOPMENTS IN PUBLIC HEALTH

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AS I observe the subject of this paper, I cannot help but remember the sayings: "A prophet is not without honor but in his own country," and, "Only fools prophesy." I may qualify in the latter category, but I am not going to waste your time on prophesies, predictions, and guesses. I want to limit my remarks to inevitables. The times and places may vary, but certain developments *are inevitable* and we had better face them, meet them, mold them, to our public and professional "weel." There are those who look back longingly, but there can be no return to "prewar normal"; "The moving finger writes, and having writ moves on—nor all thy piety or wit can lure it back. . . ."

One of the inevitable developments is obviously an extension of socialized medical and dental care. I say "extension" because we now have many of the most pernicious and objectionable systems of socialized medical care. The kind of socialized medical care practiced by hospitals and universities in their schools and clinics constitutes much that is bad. Apparently our professions approve the exploitation of interns and physicians and dentists just because it is customary.

In medical centers where advanced states of socialization are commonplace, we do not realize that there are whole states and large sections of our country where free clinics and hospitals do not exist for anyone. It is a problem, then, chiefly of distribution and equalization.

An extension of the present systems of socialized medical care to the whole country would in itself be revoluntionary. Such an extension is all that is needed in many rural areas, but it is more than we can accomplish and absorb with our present personnel. It is also plain that, in such an extension, we should be able to improve upon our present, often poor, systems of socialized medicine.

Let us define for this discussion the much misused and misunderstood term of socialized medicine, state and federal medicine, etc. Briefly, I shall use the term socialized medicine to apply to any plan of free and insurance medicine that is made available to groups of society and administered by some nongovernmental organization. State medicine differs only as it is administered by organized government, by "politics"—local, state, or national. And may I also indicate that when I speak of medicine, I am considering the total field, which includes dentistry.

As a matter of fact, the field of dentistry is an excellent field in which to determine policy for the whole medical field. The problems in dentistry are more circumscribed, the issues more clear-cut. We do not need to generalize. There is the first problem of *sheer inadequacy in the number of dentists.* This is no war shortage. With all men back and all working to capacity, less than one-fourth of the needed dental service could be rendered by the available

trained personnel. The Hagerstown, Maryland, studies show that at the present rate dental decay is occurring at six times the rate that dentists can take care of it. This was before the war. I am aware of the possible fallacy of all such studies, but conservatively, the present dental personnel, which is greater in this country than any place in the world, cannot hope to take care of more than one-fourth of the dental work necessary. It is ridiculous to talk about giving dental care to 130,000,000 people each year when all the dentists in the United States could give only 30 to 40 million persons such service. So long as this disproportion and discrepancy exists, the dentist has nothing to fear. Socialized or state dentistry can come only at his consent. Even if Congress were to vote complete dental care for every man, woman, and child, that would not make it available; and the individual dentist could and would continue his private practice, and as a private practitioner, he would always have more than he could do. If one-half of the dentists were to remain in government service, the dentists remaining in private practice would only charge higher fees and continue to do more dental work. With the removal of the economic barrier which, in the past, has limited the extent and income of dentistry, there can be but one immediate and direct result with the limited number of dentists available now (or for a great many years), and this result will be a sharp increase in the income of dentists, the extent of which is dependent chiefly upon the amount of new money made available through socialized or state dental service. This has been the experience of the general practitioner in England, whose income has increased an average of $2,000 per year since the general application of socialized medical service. Therefore, I have no hesitancy in placing among the inevitables a definite rise in the income of dentists.

Poor state dentistry will merely drive more private patients to their private dentists. The undue concern of the conservative elements in our professions about the "lousy medical care" that state medicine will provide, rings as untrue and false, for this very reason. We should be careful not to be used as "cat's paws" for powerful vested interests.

It is well for us to get a little perspective upon this matter. Extension of public education was viewed with as much concern by *educators* fifty years ago as we view the extension of socialized and state medicine today. Not by any stretch of the imagination can education be placed in as essential and strategic a position to the life, liberty, and pursuit of happiness as good dental health, and yet how many private schools have been closed or reduced in size or amount in the past fifty years? *On the contrary, with each increase of the amount and excellence of public education, there has been a corresponding increase in private schools.* I believe that it is equally inevitable that whatever extension there is of socialized and state dentistry, there will be more private practice of dentistry in ten, twenty, or fifty years than there is today, and the fees and income of such dentists will be comparatively higher. Whether you are among those doing private practice or group preventive dentistry, will be largely a matter of which you prefer. The only professional men to be markedly affected will be the poorly qualified inadequate practitioners, who may be regimented into functions which they can more readily perform.

One of the chief functions of Public Health is to look at these matters from the public point of view, as well as the professional, and in this I find, by and

large, that the dentists are much more socially minded than the physician. (Parenthetically, I have always been puzzled by this fact, and would welcome an explanation.) More dentists must be trained if we are to meet the total need. More dental schools with greater capacity must be created and maintained. This means large subsidies for both schools and students; a modified program patterned after the present military plan may well be continued in the future.

The specialties within the dental field must expand. The need for Negro dentists and for dental schools to train Negro dentists is tremendous. There can be and will be no shortening of the dental course—no reversion to less well-trained personnel. Even the speed-up program will be abandoned shortly, as it has been in Russia. In all probability the requirements for dental training will be even more strict—the course and training period lengthened. Some modification of the Harvard system will eventually be universal. All this does not spell immediate relief to the dental shortage. It will be ten to twenty-five years before there is any appreciable increase in the number of dentists available through expanded dental education. No such delay will be possible in the extension of the socialized program. Relegation of less technical work to less well-trained persons is an obvious step already being widely taken in the medical field.

The rights and prerogatives of the medical and dental professions are matters more of custom and economic aggrandizement than of common sense. Dr. Hireus, Dean of Medicine of New Zealand, recently commented upon this condition while visiting in this country. He said that he could not understand why doctors in America felt so keenly that it was a doctor's function to deliver babies (91 per cent of all deliveries are done by doctors in this country), that in New Zealand the doctors relegated this work entirely to the nurses, and that New Zealand had the lowest maternal and infant mortality rate of any country in the world. On the other hand, said Dr. Hireus, "I am appalled by the fact that here in your hospitals you permit nurses to give anesthetics. In New Zealand we consider this one of the absolute medical functions, and we would shoot a nurse who dared to transgress in the field of anesthesia."

It is generally conceded that intravenous and intramuscular injections, once a strictly medical procedure, are much better and more effectively done by nurses and technicians. When my blood is being drawn, as it repeatedly is every few months for the Red Cross, experiments, or examination purposes, I much prefer to see a nurse than a doctor approach me with one of those needles, and I prefer to see a technician than a nurse. They do a slicker, easier, and better job. I have seen the private physician, with economic pressure removed, too often promptly advocate the use of less well-trained assistants, not only to relieve him of the drudgery, but so that his knowledge and training might be more effectively used where it was needed. With the great *permanent* shortage of highly trained personnel, there is no need and no sense in our taking a narrow, labor-union attitude concerning the rights and prerogatives of our professions. We must and will relegate everything that we can to the less well-trained person. Even when we do this, we shall be far short of the 100 per cent coverage in dental care which we can hope to reach in the next fifty years.

There remain two other possible avenues of attack. It is trite to say that the ounce of prevention is worth the pound of cure, and that obviously much of the overpowering job of cure can be whittled down by the general application of such preventive programs. But even in these preventive programs, fine as they are, the emphasis must shift from the grade school back to the preschool level, and the educational part of the program will shift even further back—to the infant and prenatal periods. This means that dentists must be prepared to do such educational preventive work. Physicians are being prepared to meet this educational demand and refer pregnant patients to the dentist for preventive dental care, not only for the sake of the mother but, through proper nutrition, to build the basis of sound dental health for the infant. Such preventive dentistry will never obviate the need for dentists. It does, has, and will only increase the demand for more dentists, and it will make possible much more satisfying and satisfactory operative dental work.

The shortage of dental personnel may be partially alleviated by extended dental research. Of course, we can always hope for a "bonanza"—a "cure-all" for dental ills, but, unfortunately for the human race, that is not the history of research. Even those magic sulfa drugs and penicillin affect only a small circle of our constant enemy, disease, and their presence merely creates a demand for more trained doctors to administer the drug, rather than less medical personnel because of shorter illnesses. We have learned all the scientific intracacies of the prevention of goiter by the use of iodine in water supplies, etc., but there are more goiter specialists and surgeons today than ever before. Much as we may hope for benefit from scientific administration of fluorides, we need not expect that, or any other development, to affect materially the shortage of dentists.

More private practice, more income, more research, more preventive dentistry—these are some of the inevitable developments in the extension of socialized medicine, but they are predicated on the assumption of renewed realization of the importance of public health and the continued development of sound public health programs.

In the past, the public health has been obviously, admittedly, and openly declared the first responsibility of Government to the people. This was in the days not so long ago—in most of our early lifetimes, when plague and pestilence swept the country and when medical science was beginning to raise disease from its shades of mysticism, spirits, and demons. Great plagues of diphtheria. typhoid, malaria, and yellow fever disseminated the population of our towns and counties. The plumbing code that made this country sanitary, conveniences which were the wonder of the rest of the world, rose from the belief that sewer gas caused diphtheria. In those days, public health *was* the public concern, the first responsibility of Government.

As the great epidemic diseases have been conquered or, better, brought under control by constantly applied routine protective measures, Public Health has gradually been relegated to the basements or attics of courthouses or jails, and from this disadvantageous position it has naturally come into conflict with the more progressive doctors and dentists of the community.

As a country, we have basked in a security of artificial isolation—a false security, in a world insecure against disease. Let me illustrate by one example—yellow fever. Until recently we have felt secure against the ravages of this

disease by the application of strict "maritime quarantine" which prevented ships that touched at the two known endemic centers from entering our ports without proper preventive measures. The length of voyage from endemic centers to our ports insured the fact that yellow fever would have developed among exposed persons long before such ships could have reached our ports. Now we are faced with a realization that airplanes leaving these yellow fever-ridden areas can be in our country in a few hours, carrying infected persons as well as infected insects, and, further, that the circumscribed extent of endemic foci is a matter of error, as we have discovered recently that yellow fever is carried by jungle animals and may be transmitted to man by many specimens of mosquito. This immeasurably expands the areas that are a potential hazard to the return of yellow fever in the United States, as airplane travel immeasurably increases the risk.

Today our troops are returning loaded with tropical disease—almost to a man—with malaria, with filariasis, and with many conditions that will not show themselves for years. Malaria has us worried and baffled. It is not alone that four out of five casualties in our Armed Forces are due to malaria; it is not alone that in one military operation 33,000 casualties were caused by malaria where only 405 were caused by military weapons; it is not alone that the Army freely teaches that the first nation to conquer malaria will win the war; it is not alone that the increased number of carriers in our communities at home will expose us to possible epidemic of malaria. The malaria-carrying mosquitoes are the third most common mosquitoes even in such populous centers as St. Louis County. It is also true that the disease itself has apparently become much more resistant to all methods of treatment, and that many cases returning are having repeated remissions not controlled by the drugs that heretofore have been considered as certain remedies.

To meet this onslaught, what has Public Health to offer? In the United States, public health officers are chiefly on a part-time basis. Health officers are mostly laymen (because the doctors refuse the job), undertakers, clerks, farmers, untrained and unpaid.

Less than 1,000 of the 3,000 counties in the United States have any kind of local health organizations. Public health workers, doctors, nurses, and engineers are so poorly paid that few care to sacrifice their lives to the work. Poorly quartered and poorly financed state health departments are political footballs. Dr. Haven Emerson's comment on communicable disease illustrates this point rather well. Dr. Emerson recently pointed out that only sixteen of the forty-eight state health departments had adopted communicable disease regulations which were approved and brought up to date twenty-five years ago by such conservative groups as the American Medical Association and the American Public Health Association. Our scientific knowledge of communicable disease control has advanced rapidly in recent years, yet thirty-two of the forty-eight states still attempt to control communicable disease by regulations that were outdated twenty-five years ago. It is to this black picture of inadequacy that the Wagner-Murray-Dingell Bill would add the Herculean task of medical care. Public Health has more recently concerned itself with the causes of human suffering and sickness, not only for the saving of life but for the maintenance of man-hours and days of production and the increasing of efficiency of these man-hours and

days. In this field, dental health has taken a prominent place. One-fourth of the space of a modern health department clinic is devoted exclusively to dentistry. Health is no longer a purely personal matter. It is *once again* a matter of *public concern,* and as such, it must again assume first place in the responsibility of Government to its people. "Salus populi suprema lex esto" (The health of the people is the state's first law) must again be brought to life and take its "suprema" place in the minds and hearts of the people and their representatives. These are matters that Public Health officers cannot correct. Only with awakened citizenship and professional leadership can we correct the slovenly neglect of public health which, like the neglect to arm in 1914 and 1940, so nearly brought our military defeat. Much of the blame for this inadequacy can be laid directly at the doors of the organized dental and medical professions. It is these professions, chiefly medical men, that have largely formed "The State Boards of Health" which have the sovereign power of health in this country. It is through the ignorant neglect of such boards of health that state Health Departments have been allowed to become positions of minor importance.

All over the United States the incoming Governors who hold the sovereign power to appoint "the Board of Health" should be persuaded by the organized medical and dental professions that qualified leadership and adequate appropriations buttress the State and Local Health Department programs for the protection of public health in these critical war and postwar years.

Summary.—The future is not a crystal globe but a mirror. In it we can see certain inevitable developments: *the extension of socialized and state medicine, an increase in the dental income, an increase in private practice of dentistry, an increase in the standards of dental education, an increase in research in preventive children's dentistry.* These are some inevitable developments in the immediate future, but they are predicated upon the renewed recognition of the importance of protection of public health and the development of adequate health programs. The tools to accomplish this task are in the hands of organized medical and dental professions who, with the aid of organized public health, can and will build a better world for our professions and our people.

DISCUSSION

*Allen O. Gruebbel, D.D.S., M.P.H.**—The St. Louis County Health Department, under the guidance of Dr. E. G. McGavran, is carrying out a variety of health services which are important contributions to the promotion of health in St. Louis County. Although the personnel of the Health Department render many types of medical and dental services, the program is not in competition with physicians and dentists, but is in reality an auxiliary service to these professions.

The Dental Division of the State Health Department spent three years studying the dental health problems in the various areas in the state. The appraisal of dental needs and of available resources revealed that a well-balanced program based on the principles recommended by the National Health Program Committee of the American Dental Association would best meet the requirements in Missouri. All of these principles and policies have been put into effect in St. Louis County.

A fact which is very frequently misunderstood is that a dental health program which is administered by the Health Department is not designed primarily for the benefit of the indigent. As much attention is given to the dental needs of children of well-to-do families and of the large middle class as is provided for children of low-income families.

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As Dr. McGavran pointed out, all indications point to the fact that our government will take a greater interest in the health of the American people after the war. This interest in health which is being manifested by representatives of the people could conceivably result in one of several courses of action. It is also possible that some changes in rendering medical and dental services might actually be an improvement for both the public and the professions.

There can be no question that we need to alter our course to some degree. Dentistry today is only capable of caring for a small segment of our population adequately; too many people are receiving emergency or large replacement service instead of preventive and control service; we are not using our available knowledge to the best possible advantage.

It is my considered opinion that these changes within dental practice can and should be initiated by the dental profession. The improvements in public health services, so far as administration is concerned, should be carried out by the official public health agencies.

Public health administration in the United States has progressed from the enforcement of a few sanitary laws to a complex system of cooperative enterprise in the interest of the public. Modern public health philosophy is based on community planning and on active professional and public participation. It is now the general opinion that the health program must be brought directly to the people who are to benefit from it. The people themselves must actually participate in some kind of action; in other words, they must do something for themselves, for their families, and for the people who make up the community in which they live.

Public health dentists, working in state, county, or municipal health departments, have become an important cog in the health promotion machinery and thus serve as agents of the public and of the dental profession. Unfortunately, dentists in private practice have frequently misunderstood the motives of the public health dentist. In all probability some private practitioners feel that the public health dentist thinks in terms of regimentation for the dental profession and partisan politics. There may be some isolated exceptions, but, by and large, dental units in state health departments have been established at the request of dental societies and are managed by dental directors who have been recommended for the position by the State Dental Association.

The public health dentist has no desire to alter or to interfere with private practice; in fact, the major portion of his efforts are directed toward health education which is based largely on early and frequent dental care rendered by the family dentist. The only real complaint that the public health dentist has about the private practitioner is that some dentists will not or cannot provide dental services for children when they are referred to his office even though parents are willing to pay for such services, and very often the dentist will sign completed cards for these children without actually completing all of the services needed. In many localities this is a much more serious problem than the dental profession realizes and one that the profession should recognize and solve. It may well be that dentistry for children in the average practice is not remunerative; whatever the cause, some solution must be found and the solution should come from the profession itself.

The fundamental aims of private practice and of public health dentistry are the same: the prevention and control of disease, and the promotion of health. The private practitioner thinks in terms of the individual while the public health dentist directs his efforts toward the masses.

In 1938, the American Dental Association[1] established eight principles which would serve as a guide for organizing dental health programs. The public health dentist has resolutely and diligently followed these recommendations in the development of community education and treatment services in so far as facilities and circumstances would permit.

On the basis of approved policies, the public health dentist consults with the representative members of the dental, medical, and lay groups on problems relating to the planning and development of the dental health program; he serves as consultant and liaison officer between the state health department, and professional and voluntary groups; he assists in the organization and supervision of dental services; he brings together all groups related to dental health within the state for the purpose of the coordination of activities, the elimination of duplication, and the central planning for the organization and operation of the program; the public health dentist prepares and directs the distribution

of funds to be used in connection with dental health activities and for stimulating local contributions throughout the state; he is responsible for detailed records and data relative to the dental health program and for a continuous evaluation of dental health activities in order to revise and improve the program.

The public health dentist makes every effort to maintain a cooperative and friendly relationship with individual dentists as well as with organized dental societies. It has been the practice for several years for an advisory committee of the State Dental Association to meet at regular intervals with the officials of the state health department to assist in planning, and to approve principles, policies, and procedures to be used in the administration of the state dental health program. This arrangement has resulted in a better understanding of the problems involved and has contributed much to a cooperative attitude between the public health and the dental professions.

Public health dentistry is charged with the responsibility of improving the dental health of the public by employing the most effective and efficient procedures possible. Our greatest efforts should, of course, be directed toward prevention. Dental caries control for the present must be confined to early and frequent dental care, mouth hygiene, diet and nutrition, and the reduction of excessive amounts of carbohydrates. There are hopeful signs that caries may be markedly decreased by regulating the amount of fluorine in public water supplies as suggested by Dean[2] and Arnold;[3] or by the topical application of sodium fluoride to teeth as reported by Bibby,[4] Cheyne,[5] and Knutson and Armstrong.[6] If the incidence of caries can be reduced by one of these or by some other practical method, the dental caries problem would be brought within a range where the dental profession could take care of the smaller number who would need it. The results of recent investigations show that fluorides will unquestionably play an important part in dental caries control.

American dentistry can well be proud of its achievement as representing the finest dental service in the world, but we cannot overlook the fact that we have rendered—and are actually prepared to render—this fine service to only 25 or 30 per cent of the people. Health education for the remaining 70 per cent will never be the final answer.

A number of possibilities for a wider distribution of dental care are now being investigated: group insurance, prepayment and postservice financing plans will require careful study and long periods of trial. It may well be that one or more of these plans will eventually be acceptable to the public and to the dental profession; but there is at present no sound reason to believe that such proposals will materially control dental caries.

Bunting[7] is of the opinion that a universal dental service for children of preschool and school age would do more toward controlling dental caries and thereby reducing tooth mortality than would any other approach to the problem in keeping with our present knowledge. Such a service program would be a project of tremendous proportions, it is true; but the benefits in teeth saved and in impressing children with the importance of periodic dental treatment would justify the expenditure of public or private funds.

A number of dental treatment programs of school children[8, 9] have resulted in a marked reduction in untreated defects. In some instances the percentage of untreated decayed teeth were reduced from 69 per cent to less than 20 per cent in a five-year period.

Every community or political subdivision should support a comprehensive dental health program. Experience has shown that the first important step in community health planning is to make an appraisal of community resources. It is important to know the attitude of school authorities toward school health programs and the attitude of community leaders toward health problems in the community. It is further important that our appraisal determine the possibility of obtaining appropriations from the local government or contributions from civic organizations for financing the program.

The appraisal of the community will reveal:

a. Number of persons per dentist.
b. Number of families in different economic levels.
c. Dental caries experience rates in permanent teeth of children; and observable caries experience rates in deciduous teeth.
d. Can the dentists in private practice provide needed services, especially for all children?
e. Should dental clinics be established in schools, health centers, or hospitals?

f. How much dental health education is needed?
(Brandhorst[10] has suggested many important considerations for extending dental health services for greater numbers.)

The next step is to create interest in the community. This can be accomplished through the local Council on Dental Health, by obtaining support from officials and voluntary agencies, and by publicity.

The local Council on Dental Health should give careful consideration to the available resources of the community and should adopt a plan of action by following the recommendations of the National Health Program Committee of the American Dental Association. If a given community has a satisfactory distribution of dentists who are interested in dentistry for children, and if the per capita income of families does not justify the establishment of dental clinic services, health education activities alone may be sufficient. In other communities it may be necessary to provide clinic services for almost every child because of local circumstances. It is obvious that a considerable difference in treatment requirements exists between localities and, therefore, it is necessary that facilities be provided in proportion to the need.

The dental division of a health department, to completely fulfill its responsibilities as a scientific and professional organization, should devote a portion of its time and energy to research and to special studies. To do so will aid in contributing new knowledge and will attract the more desirable type of personnel to the public health field.

It may or may not be possible to conduct studies which require highly skilled laboratory work. Many problems can be investigated to aid in improving the services of the dental division: administrative practices, methods in health education, epidemiological studies of dental diseases, statistical measurements, and dental clinic procedures afford ample opportunity for inquiry and research.

Thus, the administration of the dental health program is integrated into the three major phases recommended by the American Dental Association: (1) dental research, (2) dental health education, and (3) dental care.

Dentistry can never be considered an isolated entity. It is a health service in which the public has an interest and thus is a part of our social structure.

Postwar plans for dental health must include a wider use of public health methods to control dental diseases; postwar plans must also include the application of preventive measures to reduce the incidence of dental caries such as were shown to be effective in recent fluorine studies; postwar plans must include a universal dental care program for all children; and, finally, postwar plans must include realistic planning for dental health in every community, under the leadership of the dental profession and public health officials assisted by local government and lay groups.

By working closely with the dental profession and by following approved policies and procedures, public health dentists can contribute much to the promotion of public health and to the advancement of dentistry.

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PROPHYLACTIC APPLIANCES IN EARLY CHILDHOOD

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DESPITE the strenuous efforts made by present-day orthodontists to disseminate greater knowledge among the general public as to the necessity and importance of prophylactic measures and the proper care of the deciduous denture, orthodontic treatment has remained the privilege of the wealthier classes. Two principal features of orthodontic treatment account for this deplorable situation, viz., the expensive nature of the appliances used and the frequent visits to the orthodontist required for purposes of checking and regulating the effectiveness of the treatment.

It must be remembered in this connection that it is not the well-to-do who provide the greater number of patients suffering from deformed jaws, but the poorer classes among whom neglect and lack of timely treatment have brought about the decay of the deciduous teeth, the first denture thus being destroyed before the completion of its physiologic function. There is, accordingly, an acute need for moderately priced devices which require only infrequent checking and examination. It is this problem which for many years has confronted me, in my capacity of orthodontist in "The Workers' Sick Fund Organization" in Palestine.

Let us first consider those injuries to the denture which arise from the premature loss of the deciduous teeth. Such injuries affect for the worse not only the ability to masticate, but the stability of the remainder of the teeth. The normal denture is in a state of equilibrium as long as it is complete. If, however, one or more teeth are lost, the teeth are deprived of their mutual support in consequence of the missing contacts, and begin to tip in the direction of the space, unless they are hindered by occlusion. Teeth with well-developed roots move more slowly than those whose roots are not yet completed or resorbed (Orban). In consequence of missing opponent teeth, a change in the vertical relationship, a closed bite, may develop. Unless proper treatment is instituted, evil consequences may subsequently be found in the fully developed denture. Changes in the occlusal plane, as well as in the condyle, may accordingly be expected to take place.

The harmful effect of the premature loss of the deciduous teeth, then, may be summed up as follows:

a. In places where a tooth has been prematurely lost there is less stimulus to further growth. The resorption of the newly built bone, which develops subsequent to the extraction of the tooth, is extremely difficult and slow—an important factor in the retarded eruption of the permanent tooth.

b. The teeth bordering the space mesially and distally are tipped, thus reducing the space destined for the erupting permanent teeth. The subsequent eruption of these teeth, consequently, does not occur at the proper place: they erupt either bucally or lingually in respect to their normal position.

c. A tooth having no opponent grows to a too great extent beyond the occlusal plane (accelerated continuous eruption—Gottlieb), the articulation thereby being adversely affected.

In order to prevent such highly undesirable consequences, the insertion of a space maintainer is of the utmost importance. For this purpose, plates made of vulcanite furnished with stainless steel springs were found to be the most suitable appliances in a great number of cases. The active part of these plates consists either of elastic, or of stainless steel wire arcs, or springs of various shapes. The desired extent of the movement of the teeth is determined by the plate itself, which is correspondingly relieved on the appropriate side. Once the necessary change of position is brought about, no additional force can be of any possible effect, since the further movement of the tooth is arrested at the border of the plate.

No hesitation need be felt at inserting a plate of this description in the case of children who live at a great distance, since it is removable and may easily be discarded whenever desired.

These plates are of especial value when applied to the deciduous denture and likewise during the shedding of the teeth. A fixed appliance, on the other hand, may cause embarrassment in such cases (e.g., partly erupted 6-year molars).

Since the type of space maintainer hitherto used generally acted as too rigid a connection between the anchorage teeth, it made insufficient provision for the development of the jaw and for the restoration of the reduced masticating function. For the purpose of preserving the space required, it was accordingly necessary to construct a new type of space maintainer which allows normal growth of the jaws and is capable of restoring the lost masticating function as well as the occlusal plane.

A number of selected cases are given below to demonstrate the working mode of the appliances suggested in cases of premature loss of deciduous teeth.

CASES

Case 1.—Child, aged 3¼ years. The central incisors in the upper jaw had been lost through some injury. Without the help of an appliance at this tender age, the lateral incisors probably would have tipped mesially, and the eruption of the permanent incisors, therefore, would have subsequently occurred in the wrong direction. The space maintainer applied in this case (Figs. 1*A* and 1*B*) did not hinder the growth of the jaw and, moreover, allowed for the increase, but not for the reduction of the distance of the banded teeth from one another. A device of this type may be applied in all similar cases with the exception of those where disturbances caused by malocclusion have to be treated simultaneously.

Case 2.—Boy, aged 8½ years. The deciduous molars in the lower jaw were missing on both sides, and at the same time the lower central incisors were in labioversion to the upper incisors. The midline was markedly displaced to the right. The upper premolars had grown into the space beyond the occlusal level. The problem we were confronted with in this case was to depress the upper premolars, to eliminate the malrelationship of the front teeth, and to

adjust the midline. Moreover, the appliance had to be constructed in such a manner as to require but infrequent checking, since the child was unable to come for treatment at short intervals. In this case the following appliance (Figs. 2*A* and 2*B*) was accordingly constructed: A lower bite plate was prepared, fitted with steel clasps for attachment to the 6-year molars, as well as with a hook distally to each canine for intramaxillary elastics. The bite blocks whose function was to replace the missing deciduous molars were formed sufficiently high to allow the lower incisors to move lingually without interference from the upper incisors. The space for the future position of both incisors had been prepared beforehand, the plate having been ground at the corresponding spot. After a lapse of four weeks the lower incisors, thanks to the elastic

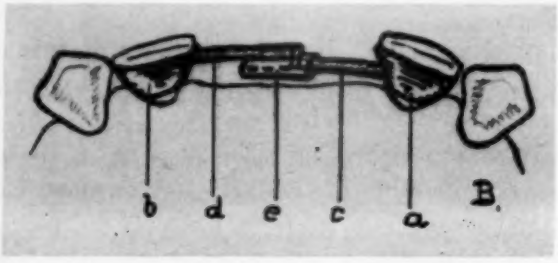

Fig. 1*A*.—Space maintainer consisting of: two bands *a* and *b*; two wires *c* and *d*, 1 mm. thick, soldered to *a* and *b*; tube *e*, one end of which is soldered to one of the wires while the other end is left open. The other wire slides into the open end of the tube. The lengths of the wires are such as to allow for the increase, but not for the reduction of the distance of the banded teeth.

Fig. 1*B*.—Space maintainer in situ.

traction, moved into the proper position. Once the labioversion of the lower central incisors had been eliminated, the lower jaw was capable of moving into its normal position (Class I, adjustment of the midline). The upper premolars were now depressed into their proper place, and the resultant normal vertical relation brought about a labial movement and uprighting of the lingually tipped upper central incisors. Our appliance had thus created the conditions necessary for a normal development of both jaws, this being accomplished after three sittings in all, in the course of one year. The appliance had to be used till the eruption of the permanent successors was completed, and the results gained were thus fixed. Figs. 2*C* and 2*D* show models before and after treatment.

Fig. 2*A*.

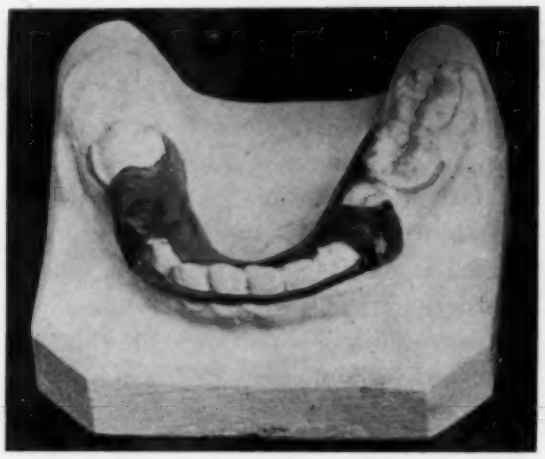

Fig. 2*B*.

Fig. 2*A*.—Lower bite plate fitted with steel clasps for attachment to the molars and with lateral bite-blocks at both sides, for the purpose of raising the bite. In the region between the canine and the premolar teeth two hooks are fixed to the plate for intramaxillary-rubber-traction to effect the retruding of the reverse bite of the central incisors.

Fig. 2*B*.—Bite plate in situ.

Fig. 2*C*.

Fig. 2*D*.

Figs. 2*C* and 2*D*.—Models before and after treatment.

CASE 3.—Boy, aged 9 years. Premature loss of the deciduous molars on both sides of the lower jaw with resulting marked overbite. Exaggerated compensating plane in the upper jaw. The eruption of the 6-year molars had been hindered to such an extent that bands could not be fitted to them. In the light of previous experience showing that the eruption of permanent successors is delayed in cases of the premature loss of the deciduous teeth, there was every probability that the eruption of the premolars would be greatly retarded, unless treated at once. Since, moreover, difficulty in mastication as well as digestive disorders were in evidence, the child's general health was greatly impaired. The appliance described herewith (Fig. 3*A*) was hence applied: A vulcanite plate, furnished with vulcanite blocks to replace the prematurely lost deciduous molars, was placed in the lower jaw. The height of these blocks was such as to cause the restoration of the lost vertical relation, and thus effect the improvement of the masticating function. Since clasps could not be fitted on account of the low level of the molars and the fact that premolars were nonexistent, the plate had to be secured by means of clasps fitted to the gums (Pelotten-Klammer).

Fig. 3*A*.—Lower vulcanite plate with lateral bite blocks for raising the bite at desired occlusion. Two gum-clasps for attachment of plate, use of bands being impossible.

The following results were subsequently achieved; the marked overbite was restored and the disturbed masticating function improved. Full development of the 6-year molars as well as the prevention of their mesial movement was effected. The upper deciduous molars were subsequently depressed into their proper position and the exaggerated compensating plane was corrected. Earlier eruption of the premolars through pressure on the alveolar crest was likewise stimulated. Figs. 3*B* and 3*C* show models before and after treatment.

CASE 4.—Girl, aged 8½ years. The mandibular arch showed a Class III malocclusion; all its deciduous molars were missing. The lower front teeth stood in a complete labioversion to the upper ones. The problem that presented itself was to unlock the bite, to correct the malocclusion of the jaws, to bring about retrusion of the lower, and a protrusion of the upper, front teeth so that the prominent chin might be modified. It may be mentioned that we were beset with numerous external difficulties: the poverty of the child's parents, the remoteness of her place of residence, and her greatly depressed state of mind on account of her facial deformity. With a view to influence the reversed overbite, we made use, in this case, of an appliance (Fig. 4*A*) consisting of a vulcanite plate in the lower jaw with bilateral bite blocks in the molar region and a bite block including the lingual side of the front teeth. The bite blocks were sufficiently high to prevent the upper front teeth from hindering the sliding

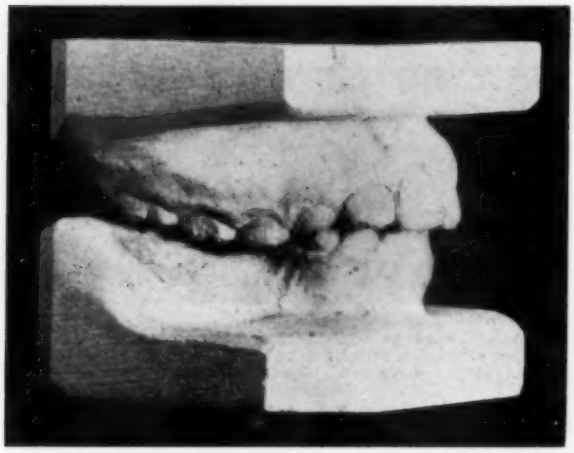

Fig. 3*B*.—Model before treatment.

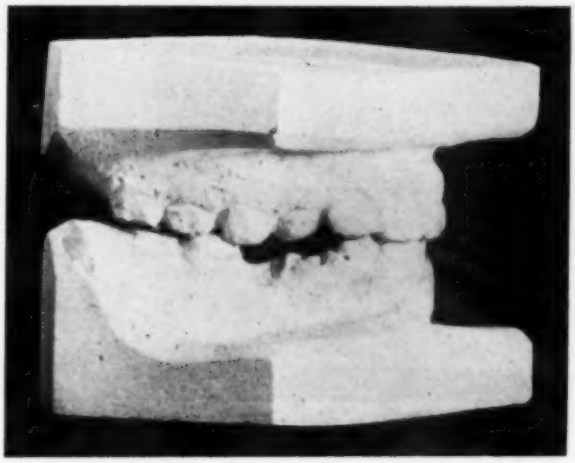

Fig. 3*C*.—Model after treatment.

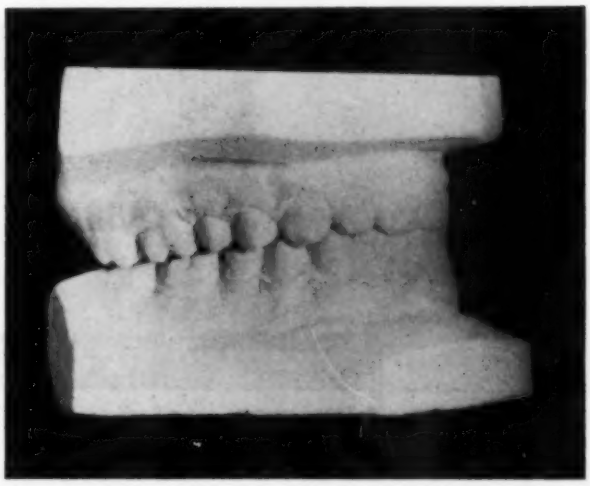

Fig. 3*D*.—Model taken about five years after orthodontic treatment.

Fig. 4*A*.—Lower vulcanite plate with bite block on each side for raising the bite, and with a narrow block on the lingual plane of front teeth for purpose of exerting pressure on the upper front teeth. The fixation consists of two steel clasps on the molars and a U-arc in the upper region of the front teeth, this U-arc simultaneously effecting the retrusion of the front teeth.

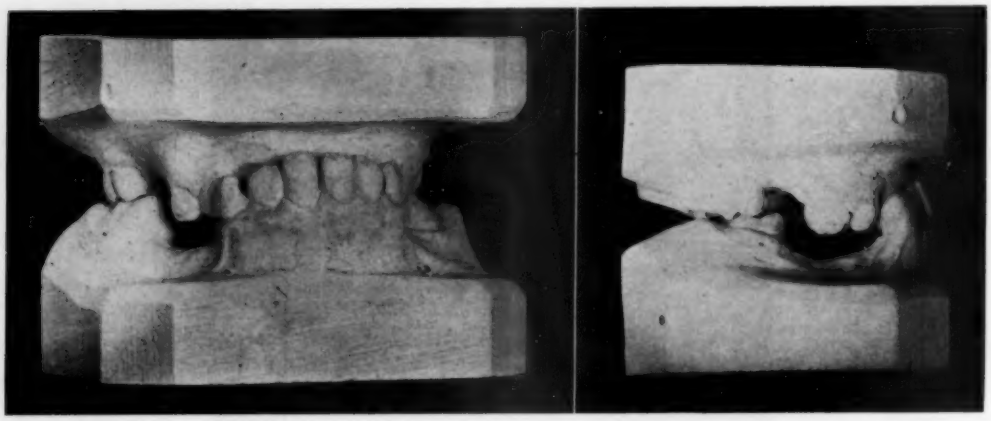

Fig. 4*B*.—Models before treatment.

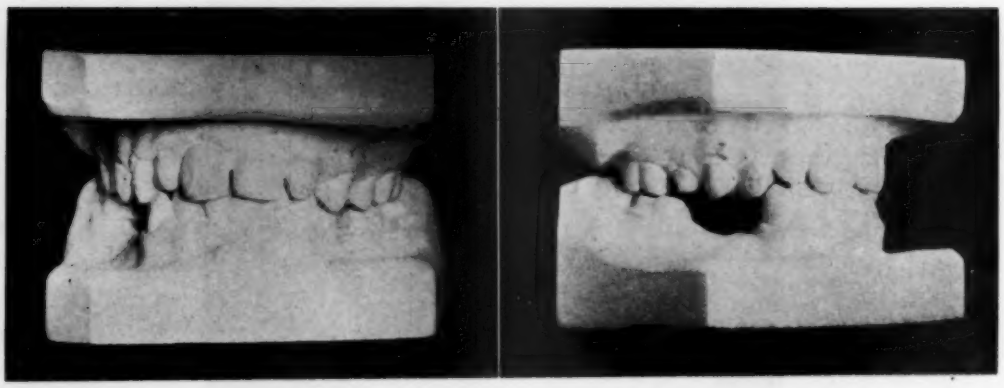

Fig. 4*C*.—Models after treatment.

back of the lower jaw and contacted the upper teeth with the exception of the 6-year molars, their continued growth having thus been rendered possible. The device used for attachment consisted of two stainless steel clasps on the molars and a U-arc in the region of the front teeth. As an additional aid, a chin cap was worn during the night for the purpose of restoring the lower jaw to its proper position (Class I), after the reversed overbite had been eliminated. This final position was fixed by itself after the undisturbed eruption of the permanent teeth. Fig. 4*B* shows models before treatment, Fig. 4*C*, after treatment.

Fig. 4*D*.—Model taken about five years after orthodontic treatment. It is to be regretted that the first molar has been lost out of lack of dental care in the course of five years, after accomplishment of the orthodontic treatment.

Case 5.—Boy, aged 11 years. A badly decayed 6-year molar in the right side of the lower jaw had to be extracted. The right lower second premolar was completely tipped lingually, being kept in this position by its antagonist. In addition to this, we were confronted with both distal and deep bite (Class II). A fixed appliance (Fig. 5*A*), designed to maintain effective, constant, and steady pressure for a short but uninterrupted period, was used for the correction of the anomalies described in this case. In order to temporarily raise the bite, a splint made of acolite was applied to the left side in the lower jaw. The splint produced, at the same time, a favorable effect on the distal bite.* The anomaly on the right side of the jaw was cured by means of the device shown in Fig. 5*A*. This appliance consisted of two bands attached to the second lower molar and the second lower premolar, respectively. A rigid wire was soldered buccally to the first band, extending at a small angle, as far as to the first premolar. A spring was soldered lingually to the same band and was ligated to the wire with silk floss. Whenever necessary, the spring was brought into action. Within a few weeks, the lower premolar had reached its normal position, while the deep bite had been completely cured (the distal bite only partially, however). The missing first molar was, furthermore, almost completely replaced by the lower second molar. Fig. 5*B* shows model after treatment

*See Autogenic Bite Raising, *D. Items Interest*, April, 1943.

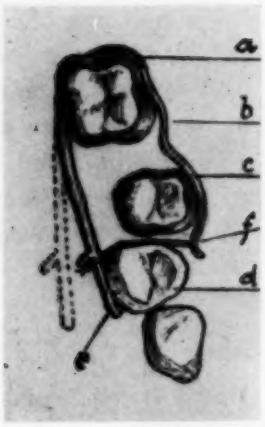

Fig. 5*A*.

Fig. 5*B*.

Fig. 5*A*.—Fixed appliance: *a* and *d* are bands on second lower molar and second lower premolar; *e*, stiff wire, and *b* spring, soldered to *a*, bucally and lingually, respectively; *f* silk floss to ligate *b* and *e* together; *c* is the first premolar.

Fig. 5*B*.—Model after treatment with both parts of appliance in situ.

Fig. 5*C*.—Model before treatment.

Fig. 5*D*.—Model after treatment.

with both parts of apparatus in situ. Fig. 5*C* shows model before treatment, and Fig. 5*D*, model after treatment.

SUMMARY

1. It is a well-known fact that the use of rigid appliances for the purpose of space maintaining occasionally brings about undesirable secondary effects, particularly if these appliances are not checked at frequent intervals. Among these secondary consequences, it will suffice to mention the development of caries beneath bands, especially if not fitted properly, and the impeding of eruption at the proper place. Fixed appliances should, therefore, be employed only in cases where they are clearly indicated, as in deciduous dentition (Case 1) or in cases of treatment of short duration (Case 5). Removable appliances do not, on the other hand, possess these disadvantages and are to be preferred.

2. In using removable appliances, it is possible to carry out various corrective operations simultaneously, thus effecting a saving of time.

3. The number of sittings for treatment may be considerably reduced. In case of illness, the appliance may be removed in the simplest possible manner.

4. The simple appliances function in a strictly physiologic manner by bringing about the improvement of the masticatory function and acting as stimulant therapeutics.

5. Early treatment at the proper time is of the greatest importance, as emphasized.

6. The great saving of both time and money makes these appliances accessible to the greatest number of children, this being the objective of social orthodontics on a large scale.

25 Bialik St.

Editorial

The Extraction Panel in Chicago

Previous to the forty-second annual meeting of the American Association of Orthodontists, held in Chicago, in April, 1944, you no doubt read in the official program sent out in advance of the meeting, that a panel discussion would be held on the subject of "The Place of Extraction in Orthodontic Procedure." You noted also that the moderator for this discussion would be George W. Hahn of Berkeley, California, and that those expected to participate would be, in the order of their talks, Charles Tweed, of Tucson, Milo Hellman of New York, George Grieve of Toronto, and Allan Brodie of Chicago.

It was noted that the men invited to participate in the discussion were chosen because each is a recognized authority in his respective field and intensly interested in the progress of orthodontics. The formal contributions made previously by each of these men have been supplemented by years of clinical experience, teaching, and a keen devotion to the subject in hand.

Even though you may be located many miles from Chicago, when you read the announcement, particularly if you are one who has followed orthodontic background and history over a period of years, you probably experienced an extra pulse, and said to yourself, "This I must hear." The announcement sounded like a possible resurrection of the Edward H. Angle-Calvin S. Case controversy over the identical subject of the extraction of teeth as an expedient in the correction of malocclusion, which occurred at about the time of the turn of the century. The Angle-Case controversy, it is to be recalled, marked the high point of orthodontic dispute for all time and left an important and deep impression on orthodontic destiny.

The Angle-Case argument more or less radiated about the focal point of the fundamental purpose of orthodontics, as to whether it begins with the teeth and ends there or whether it involves the head and face. In any event, the result of its conclusion practically fixed the unwritten law of orthodontics, that the extraction of teeth is simply not done by the expert in order to expedite or aid treatment, but only under the most extraordinary circumstances.

The traditional observation made by Dr. Angle many years ago that the best harmony and balance of the face will be found in those individuals who have normal occlusion of the teeth and a full complement of teeth also, became one of the inviolate edicts of orthodontic procedure. The Angle-Case discussion took place previous to the birth of many orthodontists who are practicing today; accordingly, extraction of teeth as a part in the correction of malocclusion is in reality one of the oldest and most contentious subjects in orthodontic history; however, it is obviously a resurrection because the subject has practically been buried for decades until the present wave of revived interest.

With the background of the past and present controversy about the extraction question, try to picture in your mind's eye a courtroom during an important trial. The lawyers for the state are on one side of the table, their faces grim and serious; on the opposite side of the table are seated the attorneys for the defense, their brief cases bulging with accumulated data. The judge raps for order and makes the opening remarks, stating plainly and without equivocation that he is fully aware of his grave responsibilities. The large and attentive audience in a "pin-drop" mood of anxiety is expectant and attentive; in fact, there is the feeling that anything can happen. The atmosphere is that of an important contest in any activity: athletics, oratory, or science.

Imagine the above picture as an over-all stage setting; then you will sense something of the atmosphere surrounding the interesting extraction panel that was held in Chicago during the American Association of Orthodontists' meeting the last week in April, 1944.

There can be no doubt that the panel was heard by the largest audience which was ever assembled anywhere, at any time, to listen to the discussion of a subject pertaining to orthodontics. The audience consisted of orthodontists assembled from every state in the Union, from Canada, Mexico, South America, and many Latin-American Countries.

Dr. Hahn, as moderator, opened the panel discussion, "Orthodontia, Its Objectives, Past and Present," and with the remarks of Dr. Hahn, the subject seemed quickly to clarify, like the sun suddenly coming through the mist. The question evolved into something like this: Is the treatment advocated by the extraction of teeth based on scientific fact or is it a compromise treatment of expediency resurrected after fifty years of inactivity on the orthodontic front?

Evidence was exhibited of cases in which premolars were extracted, as advocated by Tweed and Grieve, and reflected infinite preparation and painstaking work covering a long period of years. By way of explanation and admission, however, some unorthodox opinions were revealed. For instance, one essayist indicated he regarded some orthodontic successes by the usual methods as something less than 20 per cent, and that the record of permanent results is not nearly as good as it is presumed to be. The clinical results exhibited by these men were obviously excellent, and reflected sincere thought and precision in treatment.

There appeared to be no means, however, to provide clinical evidence as to what effect may be produced in adult life on the contour of the lower third of the face by the extraction of four premolars in childhood. This evidence should be interesting, if it were possible to obtain, as an offset to the traditional Angle tenet about the full complement of teeth and related harmony of face.

Equally spectacular and interesting was the painstaking research work revealed by Hellman and Brodie. With a background of many years of scientific research in the fields of anthropology and correlated sciences, Hellman

made an urgent plea for getting back to a fundamental scientific approach to the orthodontic problem. He pointed out that according to all fundamental laws of science there is one justification alone for orthodontics and for the orthodontist, and that is to preserve the dentition and occlusion in the human as it came from the past; he plainly regarded the present wave of extraction as a dangerous trend, threatening no good to the entire future of the specialty as an art and science. He took the position that adolescent dentitions are being regarded too lightly and that something must be wrong with orthodontic fundamentals, that such should be the case.

The evidence presented by Brodie by means of the research work done in the University of Illinois revealed that the extraction of teeth in childhood starts a chain of growth-shifting sequences, even while under treatment, that is responsible for the moving of teeth sometimes in just the opposite direction to what may be anticipated in the end result years later in the adult dentition. The traditional Angle observation previously referred to is provided considerable support by the research evidence of Hellman and Brodie, as presented before the panel.

The panel served a constructive purpose. It was conducted in a dignified manner and even though the several discussers felt their positions keenly justified, they maintained a tranquility and restraint that was amazing. The audience plainly concurred in the query of Dr. Brodie at the last, when he asked, "Why do we not have more panels?"

In retrospect and in the subsequent informal discussions, some mature and experienced men were heard to express something like this: "In certain cases it is plain you are unable to secure a satisfactory result without the extraction of some premolar teeth, but, if compelled to do so, it is prudent to do so after the supporting structure has attained considerable maturity." That, no doubt, expresses a conservative attitude expressed by men of wide experience, subsequent to the panel, and probably reveals as safe, sane, and practical a solution of the problem for the present as can be assumed. This much seems certain; the Chicago panel revealed that time must elapse to reach factual conclusions, based and supported by scientific research, and that there are two sides to the question, extraoral and intraoral, and two ages to be considered, childhood and adult.

In making up your own mind about this question, recall that fifty years ago the dental profession was extracting teeth with reckless abandon for the purpose of correcting malocclusion and, "believe it or not," they sometimes did "straighten" some incisor and canine teeth by just that method and nothing more. Angle and his followers spent a quarter of a century correcting that mistake, so, to say the least, caution is a wise policy at this time on the question of extraction of teeth.

In this instance it may be well to put into actual practice the wisdom revealed in one of dentistry's oldest epigrams: "You can always extract a tooth but you can never put it back."

The panel was a great success as agreed by all, thanks to a diligent program committee, to the essayists, and to the moderator, Dr. Hahn, whose persistent efforts made it possible.

H. C. P.

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All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Sex Hormones: Edited by F. C. Koch, Frank P. Hixon, Distinguished Service Professor and Chairman of the Department of Biochemistry of the University of Chicago, and Philip E. Smith, Professor, College of Physicians and Surgeons, Columbia University, Pp. 146, Price $2.50, Lancaster, The Jaques Cattell Press, 1942.

This volume was presented in a symposium on "The Comparative Biology and Metabolism of the Testicular and Ovarian Hormones," and is one of a number of symposia under the general title of "New Frontiers in Education and Research" presented as part of the Fiftieth Anniversary celebration of the University of Chicago.

The chemistry of estrogens, androgens, and progesterone, with special reference to their metabolism in the body, received chief emphasis in the symposium. It should be of interest to the orthodontist to know that while changes in growth and height and undergrowth and underdevelopment have been noticed in the administrations of testosterone propionate, growth in boys during the adolescent growth spurt is due in all probability to androgenic hormones from the testis.

Included are chapters by such outstanding endocrinologists as Carl R. Moore, A. T. Kenyon of the University of Chicago, Edward A. Doisy of St. Louis, and others of equal renown.

The Influence of Habit Patterns on Prevention and Control in Pedodontics: By George W. Teuscher, M.A., D.D.S., M.S.D., *J. Wisconsin D. Soc.* **20**: 41-44, March, 1944.

The dentist is faced with three general problems peculiar to pedodontics. The first is child behavior. The second concerns itself with the education of the child and the parents. The third involves the many technical problems of adequate child care.

Gingivitis is more prevalent in children than is generally realized. The dentist's attention is focused on destroyed or lost tissues, and it may be this situation which explains, at least in part, his failure to recognize, in many cases,

forerunners of tissue destruction such as gingivitis. The latter can be successfully treated in the majority of children by removing stains and debris found on the teeth, establishing a well-balanced diet, and by strict adherence to daily mouth care.

Approximately 20 per cent of all malocclusions are associated in varying degrees with one or more of the abnormal mouth habits, such as thumb-sucking, finger-sucking, lip-biting, tongue habits, etc. Others are attributed to the premature loss of deciduous teeth, tardy eruption of permanent teeth, prolonged retention of deciduous teeth, improper dental restorations, loss of permanent teeth, etc. All of the factors just named can be prevented.

Children are deeply affected by their environment. Their values will in a large measure be those of their parents. It is too much to expect children to avoid sugar when their parents partake of it in large quantities. The eating habits of the child will be largely guided by the eating habits of the parents and others with whom they have their meals regularly.

Until parents are made to see and understand their relationship to their children in so far as habits are concerned, dentistry cannot expect to do much in the prevention of dental disease. A worker in public health education argued recently that children can be used to educate their parents. It was his opinion that talks in the schoolroom would prove of great benefit to the dental health of the pupils and that, through the information brought home by these pupils to their parents, the necessary changes in diet, living conditions, home care, and visits to the family dentist would be made. Undoubtedly, some progress is shown by such means, but a child's set of values is established first by association with his parents, and second by his emotions. It is not established by a consideration of the consequences of acting one way or the other. A few years ago, during health week, students in a large high school were given cards which entitled them to free dental and medical examinations. Out of 8,000 students, 13 took advantage of this opportunity. Figures are not available as to whether any of the 13 went any further than the examinations.

Control of dental disease can be largely gained through control of dental caries and gingivitis. This means frequent, careful examinations, and good operative dentistry. Cavities that are discovered early and filled properly prevent pulp involvements, loss of teeth, and gingivitis due to food impaction. Teeth that are kept polished by frequent and careful prophylaxis will be an incentive to better home care and will not subject, as readily, the associated soft tissues to disease. Such control measures must start in very young children.

The Planning of Orthodontic Treatment on a National Scale: By K. E. Pringle, L.D.S., Eng., and E. K. Breakspear, L.D.S., Eng., *British Dental Journal* **75**: 233, Nov. 5, 1943.

With the object of helping to find out roughly the number of children likely to require orthodontic treatment under a national scheme and what personnel would be required to deal with it, the writers of this article put forward

two sets of figures taken from the material available to them. These sets of figures are not directly comparable, as the first refers to selected cases and the second to unselected ones, but they do show that even in the selected cases, the number requiring difficult technical treatment is small in comparison with those requiring simple appliances.

*First Series.**—Obtained by Mr. K. E. Pringle, Registrar to the Children's Department, from 552 clinical models of the orthodontic cases (applicants during 1941 and 1942) attending at Guy's Hospital under the care of Messrs. F. Bocquet Bull and R. E. Rix.

Group 1.—Cases requiring prolonged treatment or specialized knowledge of technique	123 =	22 per cent
Group 2.—Cases requiring treatment by simple appliances with or without extractions	297 =	54 per cent
Group 3.—Cases requiring observation and treatment, if any by extractions only	132 =	24 per cent

Second Series.†—Obtained by Mr. E. K. Breakspear from 200 unselected cases, seeing him for the first time for treatment at Coventry School Clinic.

Group 1. As above	6 =	3.0 per cent
Group 2. As above	34 =	17.0 per cent
Group 3. As above	63 =	31.5 per cent
Group 4. Normal occlusion	97 =	48.5 per cent

A Study of Malocclusion in Preschool and School Children: By John Oppie McCall, New York, N. Y., *Dental Items of Interest*, February, 1944.

A study of occlusion was made at the Guggenheim Dental Clinic over a period of a week, in December, 1942. Seven hundred and seventy-five children, 2 to 11 years of age, were examined by the intern staff as to whether the occlusion was normal or not (models not made). The children were arbitrarily divided in two groups by age, 2 to 6 years inclusive and 7 to 11 years inclusive, 7 years being taken as the average age for beginning eruption of the permanent anterior teeth and the beginning of the so-called transition period in which deciduous teeth are being lost and replaced by permanent teeth.

Of the 775 children, 152 were in the younger group, 623 in the older. Of the 2 to 6 year group, 58 or 38 per cent had malocclusion. Of the 7 to 11 year group, 371, or 60 per cent, had malocclusion. For the entire group studied, the percentage with malocclusion was 55.

Approximately 8 per cent of the deciduous age group had distal relationship of the mandible; 2 per cent, mesial relationship. In the transitional group,

*This material consists of cases which were referred in one way or another, for specialist advice. Groups 2 and 3 really require only specialist advice, not specialist treatment.

†This material consists of cases attending for ordinary dental treatment, but they would not necessarily be willing or suitable cases for orthodontic treatment.

Perhaps others would like to examine their material from the same point of view.

11 per cent had distal relationship of the mandible; 2 per cent, mesial. Excessive overbite was found in 7 per cent of the younger group, and in 14 per cent of the older; these figures were for children who showed normal mesiodistal relation of the arches.

In only one category was the percentage significantly higher in the younger group than in the older. Eight per cent of the younger children had open bite, as compared with 4 per cent of the older children. It would appear from this finding that open bite in the deciduous dentition may in many cases correct itself when the permanent teeth erupt.

In four categories the older children had significantly higher figures than the younger; in three the differences, while in favor of the older children, were slight. Special mention should be made of the figures on malpositions directly related to untimely loss of deciduous teeth or loss of permanent teeth. The percentage increases from 3 in the preschool group to 12 in the older group.

Premature Extractions.—While malocclusions directly related to premature extractions were found in only a small number of children (80 out of 775), a high percentage of malocclusions of various types is found in those who have experienced such extractions. Fifty-two per cent of the 2 to 6 year old children having premature extractions show some type of malocclusion, as contrasted with 32 per cent of children in the same age group who have had no premature extractions. In the older group, the same relationship is found. Here malocclusion was found in 67 per cent of those who had untimely loss of teeth, while it occurred in only 48 per cent of those who had no such tooth loss. This finding suggests the operation of factors having a concurrent effect in the causation of both tooth morbidity and disturbances of the occlusion.

Among the children 2 to 6 years of age having some form of malocclusion, 58 per cent had had no premature extraction, 42 per cent had experienced such extractions. It is evident that premature extraction has played a relatively small part in the production of malocclusion in this group. In those in the 7 to 11 year group having malocclusion, 32 per cent had no premature extractions; 68 per cent had premature extractions or had lost first permanent molars. Here it might seem that mutilation by extraction has apparently played a much greater role in causing the malocclusion; however, it is equally possible that the conditions which make for tooth morbidity and mortality also tend to bring on malocclusion, the tendency becoming more pronounced in children in this age range.

At the same time it must be noted that a large number of children in both age groups with mutilated mouths have normal occlusion. Forty-seven per cent of those 2 to 6 years of age with mutilated mouths have normal occlusion. The percentage is lower, as would be expected, in the 7 to 11 year group. Even here, however, 32 per cent have normal occlusion. Attention is drawn also to the large number of children in both groups who have experienced premature extractions. The percentage in the children below 7 years of age is 30; in those between 7 and 11, it is 60.

The figures quoted above and also the figures for the individual types of malocclusion found are shown in the following tables:

TABLE I

TYPES AND PERCENTAGE OF MALOCCLUSIONS IN 775 CHILDREN 2 TO 11 YEARS OF AGE

TYPES OF MALOCCLUSION*	GROUP 1 2 TO 6 INCL.	GROUP 2 7 TO 11 INCL.
A. Involving Arch Malrelation		
1. Distal relation of mandible	8.5	11.2
2. Mesial relation of mandible	2.6	2.0
3. Posterior cross-bite	4.6	5.1
B. Not Involving Arch Malrelation		
1. Overlapping (crowding) of incisors	1.3	3.8
2. Excessive overbite	7.9	14.9
3. Labio- or linguoversion	0.0	3.5
4. Malposition due to drifting after extraction	3.9	12.0
5. Narrow arch	0.6	1.4
6. Open bite	8.5	4.1
7. Rotation of incisors without crowding	0.6	0.9

*Often more than one type of malocclusion was found. In such cases the type having the greatest functional significance was recorded.

TABLE II

NUMBER AND PERCENTAGE OF CHILDREN WITH NORMAL OCCLUSION AND MALOCCLUSION IN RELATION TO PREMATURE EXTRACTION

	NORMAL OCCLUSION		MALOCCLUSION	
	NUMBER	PER CENT	NUMBER	PER CENT
Group 1 (age 2-6)				
No premature extraction	72	68	34	32*
Premature extraction	22	48	24	52
	94		58	
Group 2 (age 7-11)				
No premature extraction	128	52	116	48
Premature extraction and/or loss of permanent molar	124	33	255	67
	252		371	

*Decimals omitted.

TABLE III

NUMBER AND PERCENTAGE OF CHILDREN HAVING MALOCCLUSION IN RELATION TO PREMATURE EXTRACTIONS

	NUMBER	PER CENT
Group 1 (age 2-6)		
No premature extraction	34	59*
Premature extraction	24	41
	58	
Group 2 (age 7-11)		
No premature extraction	116	31
Premature extraction	255	69
	371	

*Decimals omitted.

News and Notes

Commissioning of Women Dentists

Women dentists, who will serve alongside the men of the Dental Corps of the U. S. Navy, are to be commissioned through the WAVES, according to an announcement received by the Liaison Office of the American Dental Association, from the Navy Department.

Under the new ruling which will enable women dentists to serve in the same capacity as men, the qualifications are the same as for men dentists except that duty will be within the Continental limits; the applicant may not be married to an officer in the Navy, and may not have children under 18 years of age.

Further information may be obtained at any office of Naval Officer Procurement or at the Bureau of Naval Personnel, Washington, D. C.

At the same time, Captain Joseph Tartre, U.S.N., D.C., announced at Great Lakes Naval Training Center that Dr. Sara G. Krout of Evanston, Illinois, has been commissioned a full lieutenant in the Dental Corps of the U. S. Naval Reserve, through the WAVES, and reports for duty at Great Lakes on June 1. Dr. Krout becomes the first woman to be appointed to such duty in this area. She will treat regular Navy personnel as well as WAVES who are stationed at Great Lakes.

A Suggestion

A suggestion by Dr. Joseph K. Gold is as follows: "In the March, 1944, issue of the JOURNAL, page 166, there is a short note on 'Photographs of Orthodontic Models.' The engravers suggest adding light yellow ocher to the plaster. I doubt if orthodontists would care to make that change. However, if the models are photographed with a spotlight as the light source, in addition to general illumination, the flatness will disappear, and the angles, depth, etc., will be brought out very nicely."

New York Society of Orthodontists

The fall meeting of the New York Society of Orthodontists will be held at the Waldorf-Astoria Hotel, New York City, on Monday and Tuesday, Nov. 13 and 14, 1944.

ANNOUNCEMENT

Extraction Panel Number

A special Extraction Panel issue of the JOURNAL will soon appear, in which will be published all of the papers that made up this Panel at the Chicago meeting of the American Association of Orthodontists, in April. This will make it possible for the readers to have a record of this interesting discussion concentrated in one issue of the JOURNAL.

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*The Journal will make changes or additions to the above list when notified by the secretary-treasurer of the various societies. In the event societies desire more complete publication of the names of officers, this will be done upon receipt of the names from the secretary-treasurer.

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*The Journal will publish the names of the president and secretary-treasurer of foreign orthodontic societies if the information is sent direct to the editor, 8022 Forsythe, St. Louis 5, Mo., U. S. A.

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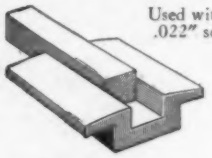
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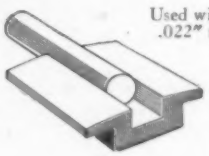
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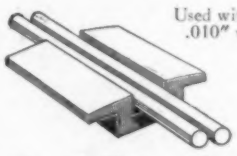
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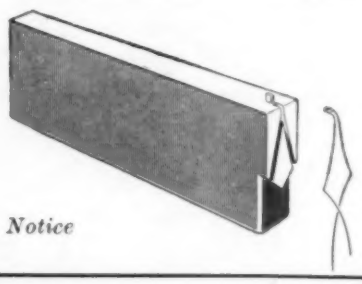

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